



Surrounded in the Clock Tower belfry by four smaller bells ringing the “Westminster chimes” is Big Ben itself, which strikes the hours. After the first 16-tonne bronze bell cracked during testing in 1857 (Denison was blamed for specifying an overweight hammer) the Whitechapel Foundry broke up Big Ben 1 and recast Big Ben 2, at 13.7 tonnes. Big Ben finally rang out on 11 July 1859 but by September 1859 the new bell had also cracked. Big Ben was silent for four years before the crack was patched up, the hammer lightened, and the bell turned by 90°. During this time, the hour was struck on the fourth quarter bell.



# Paul Roberson

Clockmaker to the Palace of Westminster



It is 150 years since Big Ben first rang out over London - an anniversary that's keeping the Palace of Westminster's trio of clockmakers very busy this year. *QP* enjoyed a tour of the Great Clock Tower with Paul Roberson, 51, whose team is responsible for ensuring that Edward J Dent's giant grandfather-style mechanism remains the most accurate striking mechanical turret clock in the world - within just one second per day. And if that's not pressure enough, there's also the maintenance of the 2,000-or-so clocks dotted throughout the rest of the Palace.

**Alex Doak**

## **How do you feel when you are at the top of the Tower? Is it still a thrill?**

It is. I still get a buzz; I never try to get out of going up there when it needs to be wound [on Mondays, Wednesday and Fridays]. Being in the centre of London, looking out over the hustle and bustle from the belfry, it still touches me. And the movement too - when you go up there and it's still ticking away, it's certainly very special.

## **It really came home to me when I stood behind the clockfaces - they're vast.**

If the sun is shining and you get a nice shadow off the minute hand that's a real treat. The bells are impressive, Dent and Denison's movement is impressive, but once you get behind the dial, in between the glass and the walls of the movement chamber - that is where you find the real wow factor. On every tour we try to go in there first and as soon as people see it they audibly gasp and know immediately that those 354 steps up have been worthwhile.

## **I am amazed that you conduct so few tours during the rest of the year - the history, the inner workings, even the view should surely make this one of the most interesting attractions London has to offer?**

There are tours, which you can organise through your MP, but the only guests we normally have are the MPs themselves. It's surprising the number of people you take up there, whether it's someone who works in the Treasury or what have you, and they say: "Well I've walked past here every morning for the past 20 years, looked up and seen the time, but never thought beyond that..." As you say, when you go up and see a pendulum swinging and you tell them that pendulum has been swinging for the past 150 years, they are pretty amazed.



Announcing Big Ben, the largest bell ever cast in England.

**As a clockmaker it must be one of the greatest privileges, tending to the most famous timepiece in the world?**

It is. It's no longer the biggest or largest - but we always say that without doubt, the world over, it's certainly the most famous.

**And an enormous responsibility – do you ever feel overawed by that?**

A little bit. It's a bit strange I suppose - when it's just us and the mechanism up there, you don't tend to be aware of the importance. But when you go outside and see everyone looking up at it and hear the chimes being transmitted live on Radio 4, you do appreciate your responsibility - but perhaps luckily we don't look at it like that, otherwise we'd probably start panicking! We take it seriously though - especially on certain occasions, like New Year's Eve. We're always a bit anxious on New Year's Eve. The powers that be always want

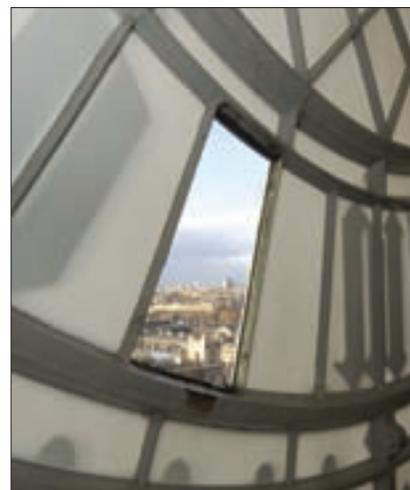
the big projected display on South Bank to tick over right on the first strike of Big Ben. So that's the one occasion it really does have to be spot on. Even if everything is running smoothly at 11pm, you still have to check before midnight. Only once you get that first bong can you relax and watch the fireworks.

**I was amused to learn you simply use the Speaking Clock to check the time. How many times to do call on NYE?**

We'll go up at 8pm and check every hour till 11pm.

**What about when the clocks go back?**

We actually go up there about 8 o'clock to start preparing and we're ready to start the procedure at 10 o'clock. At 10, we switch the dial lights off and we stop the clock. We then silence the strike train and silence the chime train. And then we can open up the gravity arms on the escapement [Denison



## There are 2,000 timepieces in the Palace so when the clocks go back it's a busy weekend

invented a special 'double three-legged gravity escapement' that isolates the pendulum from the going train, ensuring that the effect of the elements pounding against all eight hands don't affect the timekeeping]. The hands whizz round and we stop it at 12 o'clock. That's the point when we can get in, check things and carry out any maintenance.

It's the only time of the year when we're allowed to stop the clock, so if there's any maintenance that needs doing we need to plan that in. We don't start it again until what would be the new 12 o'clock - it's ticking but it's not chiming or striking at that point and the dial lights are still off so no one can see it's an hour behind. Then we can check it for timekeeping until the new 2 o'clock, when it's the official time change. At that point the strike comes back on, the chimes come back and the dial lights come back on. Then we normally hang about until 3am because that's the first time it strikes again

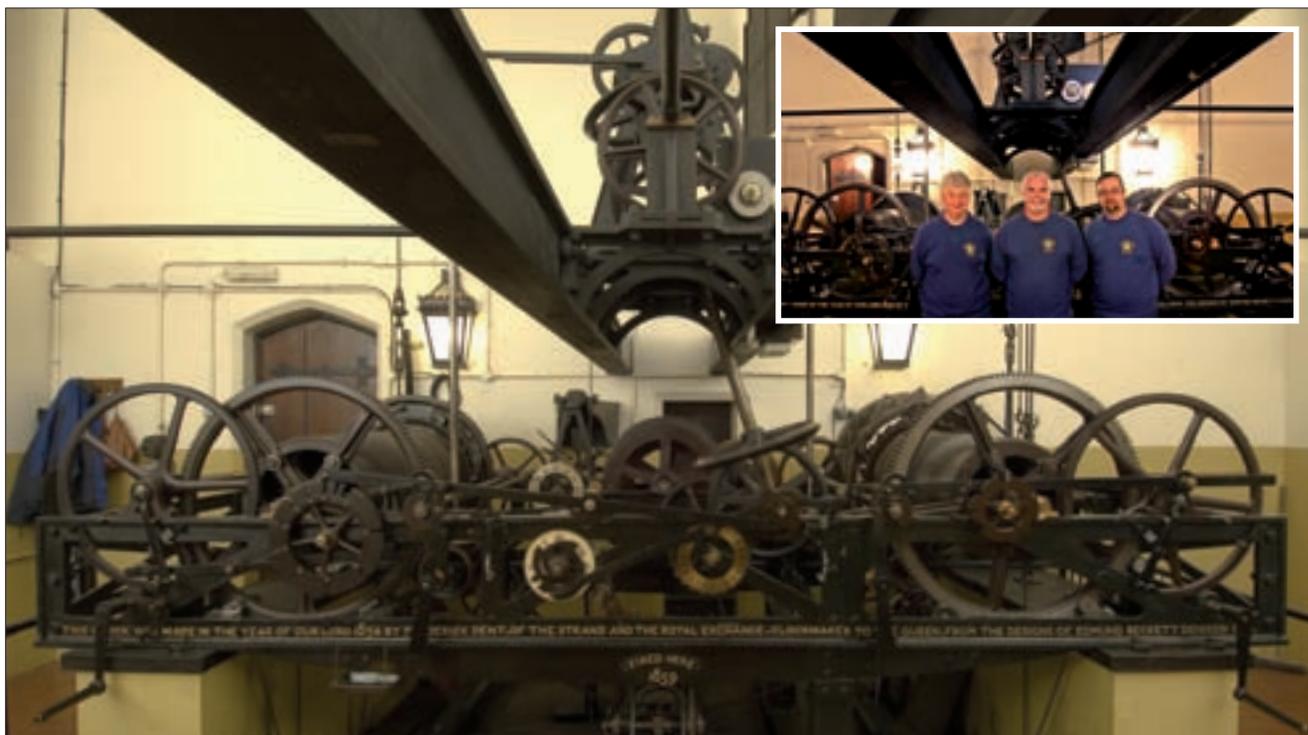
after 2am. As long as it's fairly accurate we can leave it at that. Also, there are the 2,000 other clocks that we look after throughout the whole Palace, so it's a really busy weekend for us.

### And you service and maintain all of the mechanical clocks between the three of you?

We do it all in-house. We're lucky; we have a very well-equipped workshop. We've got real cutting-edge facilities, a top quality lathe, everything. We're pretty much able to make virtually any part we need. Obviously some of the stuff for Big Ben gets farmed out because it's just so big. We had a worn bearing on the great wheel, which is almost 4 feet in diameter, but with a little research and asking around we were able to find an engineering company that had a lathe big enough to do the job. You need to use a forklift truck just to change the chucks.

Above Left: Little has changed in the aesthetic of the New Houses of Parliament since this vision was captured in 1840.

Each face is 7 m in diameter and has 312 separate pieces of pot-opal glass panels framed by gunmetal. Illumination of each dial is achieved by a bank of 28 oversized energy-efficient bulbs at 85W each. The lifetime of each bulb is 60,000 hours.



Big Ben's impressive mechanism, housed in a chamber behind the four dials. Designed by Edmund Beckett Denison - barrister, MP, gifted amateur horologist and, critically, the friend of Astronomer Royal Sir George Airy - Edward J Dent's stepson, Frederick, completed the clock in 1854 for a final bill of £2,500. Installation was delayed by five years, but during this time, Denison added his famous 'double three-legged gravity escapement' - the key to Big Ben's accuracy.

Inset: The Palace of Westminster Clockmakers - Paul Roberson, Ian Westworth and Huw Smith.

### Are there any valuable clocks in the Palace?

Lots of them are very valuable for their provenance - just imagine what the clock in the Prime Minister's office has seen. It's a lovely grandfather clock, but it's not of any huge value. The nicest clock we have is a Vulliamy regulator, which was ordered and built especially for the Palace members' entrance.

### And how often do you get to take that apart?

Unfortunately for me, it's an extremely reliable machine, so not very often at all.

### What would you say were the idiosyncrasies of Denison and Dent's Big Ben mechanism?

It's got odd little things. A lot of them are because of the sheer size of the mechanism - such as the locking levers. When it finishes chiming and striking the locking lever comes round with such a clout that lubricants tends to get knocked off pretty rapidly.

### The 4.4 m pendulum is powered by three stone weights totalling 2.5 tonnes. With such huge forces at play, isn't it dangerous to fiddle with this mechanism?

If you don't know what you're doing it's dangerous, yes. After the huge accident in 1976 - when one of the governor fans' flyshafts snapped and the whole

mechanism smashed apart - they installed safety brakes on the strike and chime mechanism. If the mechanism starts whizzing around uncontrollably and the weights drop 4.5 inches, the safety brakes stop it immediately. Because it's so high up and out of sight from everyone, we still tend to go up there in twos, though.

### How did you get the job?

I answered an ad in the *Horological Journal* about four years ago. In the end it was advertised worldwide, believe it or not. All three of us joined within the past five years, before that there were a couple of clockmakers who'd been here for years and years and they both retired close together.

### It must have been quite a change of scene?

Of course. My watchmaking apprenticeship started in the workshop above Fish Brothers jewellers when I was 16 and I worked my way up to workshop manager before they decided there was less call for a watchmaker on the premises, so closed the workshop down. I worked at home for a little while until this job was advertised and I decided the luxury of paid holidays was too tempting. Obviously, working on Big Ben was a big magnet too. I've always enjoyed clocks more than watches - anything overly mechanical I find fascinating, especially motorcycles - but I still like to keep my hand in with watches; it's sort of a hobby and



Paul Roberson beside the case that houses a replica of the double-legged gravity escapement that he made.



obviously friends like you to do their watch repairs. It's good to keep your hand in.

### Doesn't it play on your mind that you don't have an apprentice working in your workshop at the Palace?

It does. The biggest problem we have here is that most of our clocks are English style timepieces though - there just isn't the variety of work. Every now and then we do discuss what's going to happen in years to come. I'm 51, in 14 or 15 years that's it. We need to think about training people up.

### Do you think the new School of Watchmaking in Manchester will help things?

Definitely. I sit on the council at the British Clock and Watchmakers Guild and we're trying so hard to encourage youngsters into the trade. I think it's gone full circle. A little while ago, the workshops were full of watch and clockmakers and they weren't terribly well paid. Now, they are so few and far between that we are having to pay them good money. We have gone past the stage of everyone saying: "Why should I have a good watch when I can

get one from a petrol station?" Now there's a good market for proper watches and you'll always need the people to repair them. We need to make sure that we keep a lot of these skills alive and active because once things go dormant and you lose a generation, that's it. Like so many arts, when it's gone, it's gone.

I feel a little two-faced though, because people always ask if my son is coming into the trade and up until recently I would have discouraged him. Now it's a bit different - you can demand a reasonable salary, because people expect to pay reasonable money to have valuable clocks repaired. But 20 years ago, when you would get an average mechanical watch in for repair, I just think about what we used to do - strip the movement to nothing, clean it, reassemble and regulate... and what you would get was an absolute pittance. And yet when your washing machine goes wrong all they do is replace that little switch that broke, and charge a fortune. The washing machine is running a couple of hours a week, whereas your watch is running 24 hours a day, seven days a week. But things are changing now. Once watchmaking becomes even more attractive, people will start to come back. ☺

Top right: Pre-decimal-currency pennies are still used by Paul and his team to regulate the clock mechanism: adding one penny causes the clock to gain two-fifths of a second in 24 hours.

Above: A view down the stairwell of the clock tower.

**Further information:** <http://www.parliament.uk/bigben/>

Tours of the Houses of Parliament Clock Tower are free and open to UK residents who have requested a visit through their local MP. Children under the age of 11 are not permitted. Tours for overseas visitors are currently not permitted. During the 150th anniversary year demand for tours is expected to be high. Therefore, preference will be given to those with a proven interest in clocks, watches and bells.