

Big Ben

Chimes in 150 years

Big Ben, as the Great Clock of the Palace of Westminster in London is universally known, was first set in motion in 1859. Since then, the world's largest four-faced chiming clock, with its instantly recognisable "Bong" has become a British icon, famous worldwide for its accuracy

Clock Tower:
Designed by
Charles Barry and
Augustus Pugin
Height:
96m

Bells

GREAT BELL
Shares nickname
"Big Ben" with
tower and clock.
Probably named
after **Benjamin Hall**, First
Commissioner
of Works

First bell cracked
while being tested.
Recast bell first struck
hour on **July 11, 1859**

Weight: **13.7 tons**
Height: **2.2m**
Diameter: **2.7m**
Hammer weight: **200kg**

QUARTER BELLS

On quarter hours four
smaller bells play chime
based on **Handel's Messiah**:

*"All through this hour
Lord be my guide
that by Thy power
No foot shall slide"*

Clock faces

Each of four cast iron
dials is seven metres
in diameter and contains
312 sections of pot
opal glass

Hour hands

Length: **2.7m**
Weight: **300kg**

Material: **Gun metal**

Minute hands

Length: **4.2m**
Weight: **100kg**

Material: **Copper sheet**

Great Clock mechanism

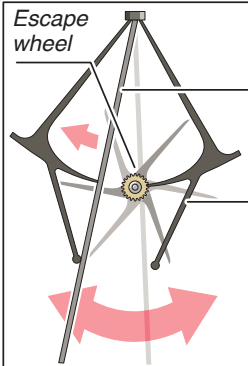
Gravity-driven, consisting of three "trains" –
Going, Chime and Strike Train – each made up
of barrel connected to weight suspended below
by steel wire. As weights drop, barrels turn,
setting in motion hands and bells through
series of gears, wires and shafts

Built by clockmaker **Edward Dent** from design by lawyer,
MP, and amateur horologist **Edmund Beckett Denison**
with assistance from Astronomer Royal, **George Airy**

GOING TRAIN

Moves clock hands via gears driven by single shaft

Going train is controlled
by **Double Three-Legged Gravity Escapement** (right) –
Denison's ground-breaking invention
in which impulse to
pendulum is not given
by escape wheel, as in
deadbeat escapement,
but through gravity
force of two arms.
**This frees pendulum
from friction,
ensuring
accuracy**



Pendulum
alternately
touches each of
two arms every
two seconds,
unlocking
escape weight
Locking arms
then fall back
under own
gravity, hitting
pendulum to
keep swinging

Mechanism dimensions

Length: **4.7m**
Width: **1.4m**
Weight: **5 tons**
Frame material:
Cast iron girder

Great Clock stoppages

■ **1962:** Clock chimes in New Year ten
minutes late due to heavy snow on hands

■ **1976:** Clock shut down for 26 days over
nine months after chiming mechanism
disintegrates through metal fatigue

■ **2005:** Clock mechanism stopped for
two days to allow inspection of brake shaft

■ **2007:** Mechanism replaced by electric
motor to allow six-week maintenance
work. Clock dials cleaned and repaired
in preparation for 150th anniversary

CHIME TRAIN

Rings four quarter bells via steel
wires connected to bells' hammers

Every 15 minutes, lifting arm falls off
relevant wheel segment. Length of segment
determines length of chiming sequence

STRIKE TRAIN

Rings hour
bell via 1 ton
strike weight
suspended
beneath

Weight drop
rotates barrel,
pulling wire
connected to
bell hammer

Pendulum

Length:
4.4m
Weight:
310kg

Clock adjustment: Placing
old penny coins on ledge alters
pendulum's centre of mass. Adding
or removing one penny changes
clock speed by 0.4 seconds per day



Maintenance

Clock wound up by hand three
times a week – takes over one
hour as it is not possible to
wind while clock is chiming



Pictures: Getty Images
Sources: UK Parliament, Whitechapel Bell Foundry