CLOCK REPAIR

A Beginner's Guide

Ian Beilby

Clocks Magazine Beginner's Guide Series № 1

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CHAPTER 1
The Movement

Figure 1 shows a a simple time-only—or 'timepiece'—clock: it does not 'strike' the hours or 'chime' on the quarters. You can see in **figure 2** I have removed the mechanism or 'movement' from the case, and in **figures 3** and **5** I have made detailed annotated


Figure 1.

line drawings depicting the movement. From **figures 2** and **3** you will see that the movement consists of a series of gears that engage with each other. The large brass 'wheels' engage with the smaller steel 'pinions'. Both wheels and pinions run on 'arbors', not axles!

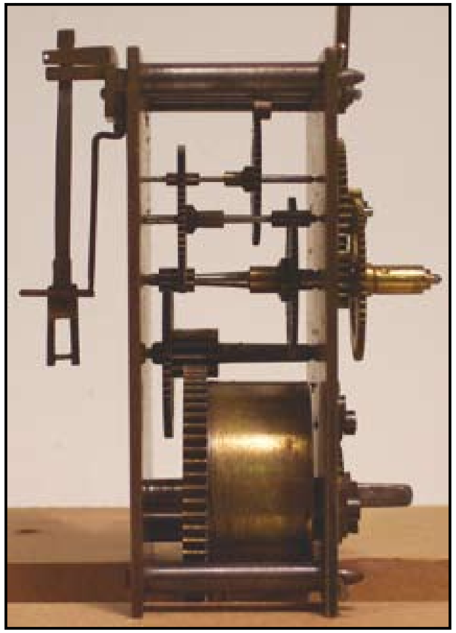
The steel pinions are cut integral with the arbor. Each end of the arbor is turned down or reduced slightly in order to produce 'pivots'. The pivots run in 'pivot holes' provided in the movement 'plates'.

The combined wheelwork is known as a 'train' of wheels and is contained between the front and back plate of the movement. Four movement 'pillars'—one at each corner—separate the two plates. The pillars are usually permanently fixed to the back plate (the plate furthest from the hands). The front plate is attached to the pillars with taper pins. Tapered spigots are turned on the ends of the pillars, which protrude through holes provided in the front plate. The spigots are cross-drilled to accept the taper pins.

On this movement the driving force for the clock is provided by a powerful spring, the 'mainspring', which is contained in brass 'barrel' or 'going barrel'. The barrel also acts as the driving wheel for the movement via teeth cut into its periphery

Figure 3 shows the going barrel in relation to the other wheels, it is not only the largest, but also the first in the train of wheels. The 'winding arbor'—the arbor on which the going barrel runs—is provided with a square on to which the clock key fits. The inner coils of the spring are attached to a 'hook' on the winding arbor, and the outer coils are attached to a hook in the wall of the barrel.

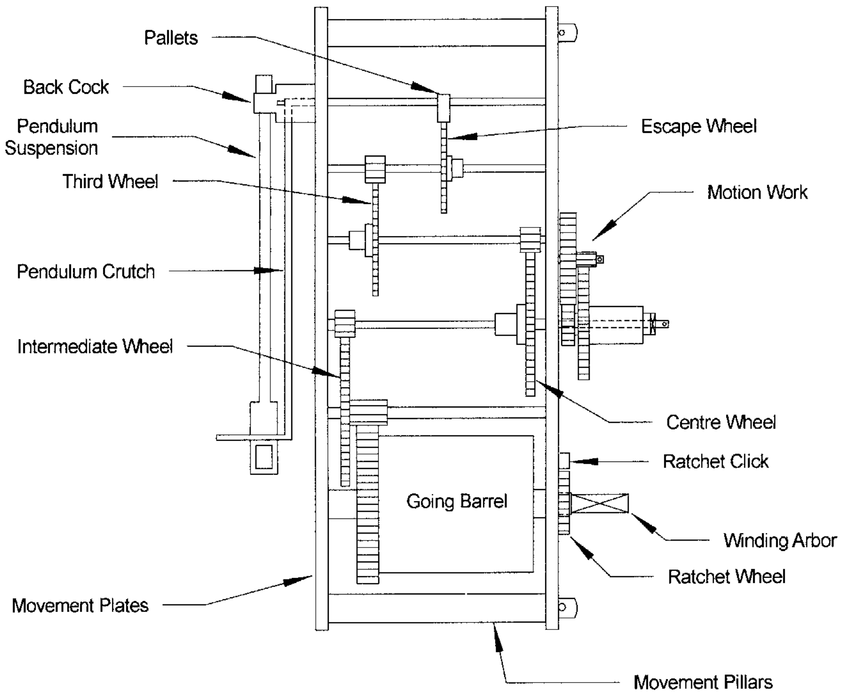
On the outside of the front plate a ratchet wheel is fitted on to the square of the winding arbor and a sprung 'click' provided to keep the ratchet wheel in place. The ratchet wheel and click allow the arbor to turn in a clockwise



the centre wheel is designed to revolve clockwise once every hour. In **figures 3** and **5** you can see the centre wheel arbor is longer than the others and protrudes through the front plate of the movement. When the clock is assembled this arbor will protrude through the centre of the face or 'dial' and the minute hand will be affixed to it.

The centre arbor drives the 'motionwork' the name given to another set of gears, mounted on the front plate, that drives both hands in a clockwise direction. You can see the motionwork on this clock in **figure 4** as well as the winding square, ratchet wheel and click. For clarity, a drawing of just the motionwork and centre wheel is given in **figure 5**.

With this movement the motionwork comprises four gears. A small pinion of 16 teeth is attached to a 'pipe' made to be a tight fit on the centre arbor. This component is called the 'cannon pinion'. The end of the pipe is squared. The minute hand locates on this square. Running on the pipe of the cannon pinion is the hour wheel, which is also fitted with a pipe. The hour hand is fitted on to this pipe. Both the



cannon pinion and hour wheels engage with another separate combined wheel and pinion fitted to the front plate. This wheel and pinion is usually called the minute wheel. The combined gearing of these wheels ensures that both hands turn in the same direction and provides a reduction of 12 to 1, ensuring that the hour hand turns only once for every 12 revolutions of the minute hand, *ie* once in every 12 hours

The speed of the hands is determined by the rate at which the centre hand is allowed to revolve. This is controlled at the top end of the gear train (the end furthest from the going barrel) by the rate at which the teeth of the 'escape wheel' are allowed pass through the 'pallets' of the 'escapement'.

The escape wheel is so called because it allows the power of the clock to literally escape, in a controlled and regular manner. **Figure 6** is a drawing of a typical escape wheel and pallets. The teeth of the escape wheel are cut differently to conventional wheel teeth and the escapement is designed so that the escape wheel teeth are released one at a time by the pallets. At the same time as the escape wheel teeth engage the pallets they provide a little power, or 'impulse', to the pallets, which keeps the pendulum swinging. The rate at which the pendulum swings, which depends on its

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