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PICTURE GALLERY

'PENDULUM = CLOCK'*
signed *2nd. James Harrison Barrow 1727*

Prior to John Harrison making his first Sea Clock, now known as H1, a number of wooden longcase clocks were made in Barrow. The first three clocks, made before 1720, used conventional anchor escapements. These were followed *c.*1722 by the wooden turret clock at Brocklesby Park which incorporated Harrison's first Grasshopper escapement (which eliminated sliding friction) and his first use of anti-friction rollers. The materials used and its constructional features enabled the Brocklesby clock to run without oil.

Following Brocklesby a numbered series of precision pendulum longcase clocks with Grasshopper escapements, were also made at Barrow. Three of these clocks survive, the clock illustrated here being the second in this series. In these clocks Harrison took all the Brocklesby developments further forward. The movements made more extensive use of rolling friction and the escapements were further improved using a single pivot point for both pallets (the co-axial Grasshopper escapement). Most important of all, they were fitted with a temperature compensated pendulum using Harrison's invention of the grid-iron principle with a suspension system adjustable for isochronism. These precision pendulum clocks are important because the information gained in their making, testing and working lead directly to the construction of H1, the first of the three Sea Clocks, and all that followed.

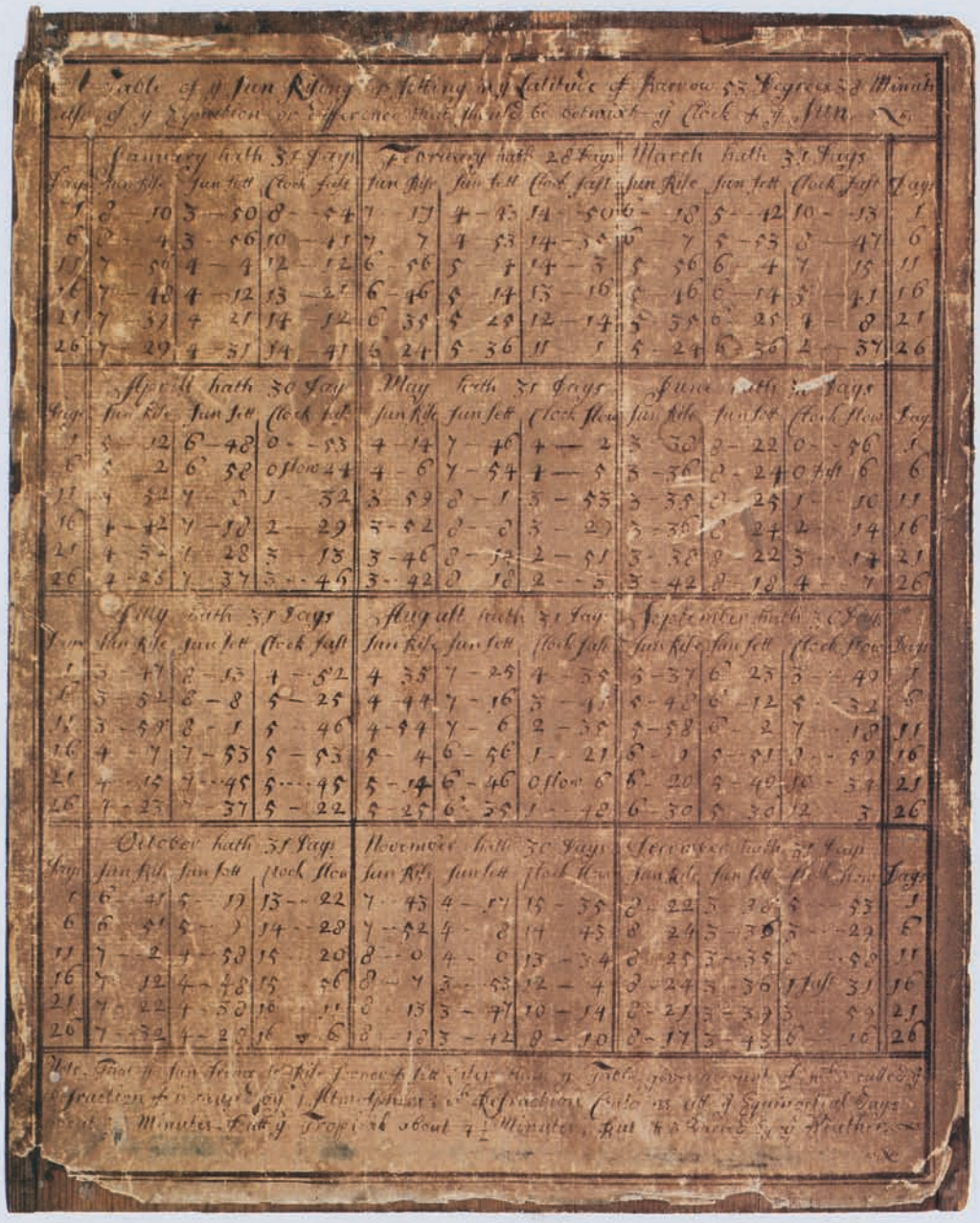
The pine case of the clock shown here (No.2) has survived in a remarkably original condition. Only the skirting to the base is a later addition. The style of the case seems to be the Harrisons' interpretation of contemporary Hull/ London designs, with the adaptions required to accommodate the large movement. Details of the case, dial and movement of this clock, a landmark in the quest for precision in timekeeping, are shown in the following pages.

The clock is part of the collections of Leeds City Museums and will soon be on public display. Text by Andrew King, photography by Jeff Darken.

*Harrison's name for these clocks.

The decoration on the black varnished ground is simply delightful. One can imagine how the floral design, when new, would have shimmered in a candlelit room of the period. The surviving colours include gold and crimson, and where the decoration has been lost there may have been silver.

PICTURE GALLERY



A Table of ye Sun Rising & Setting in ye Latitude of Barrow 53 Degrees 38 Minut's also of ye Equation or difference that should be betwixt ye Clock & ye Sun.

The original equation table in the hand of John Harrison based on the Julian calendar. The open trunk of the clock (opposite page) shows the original door hinges and lock.

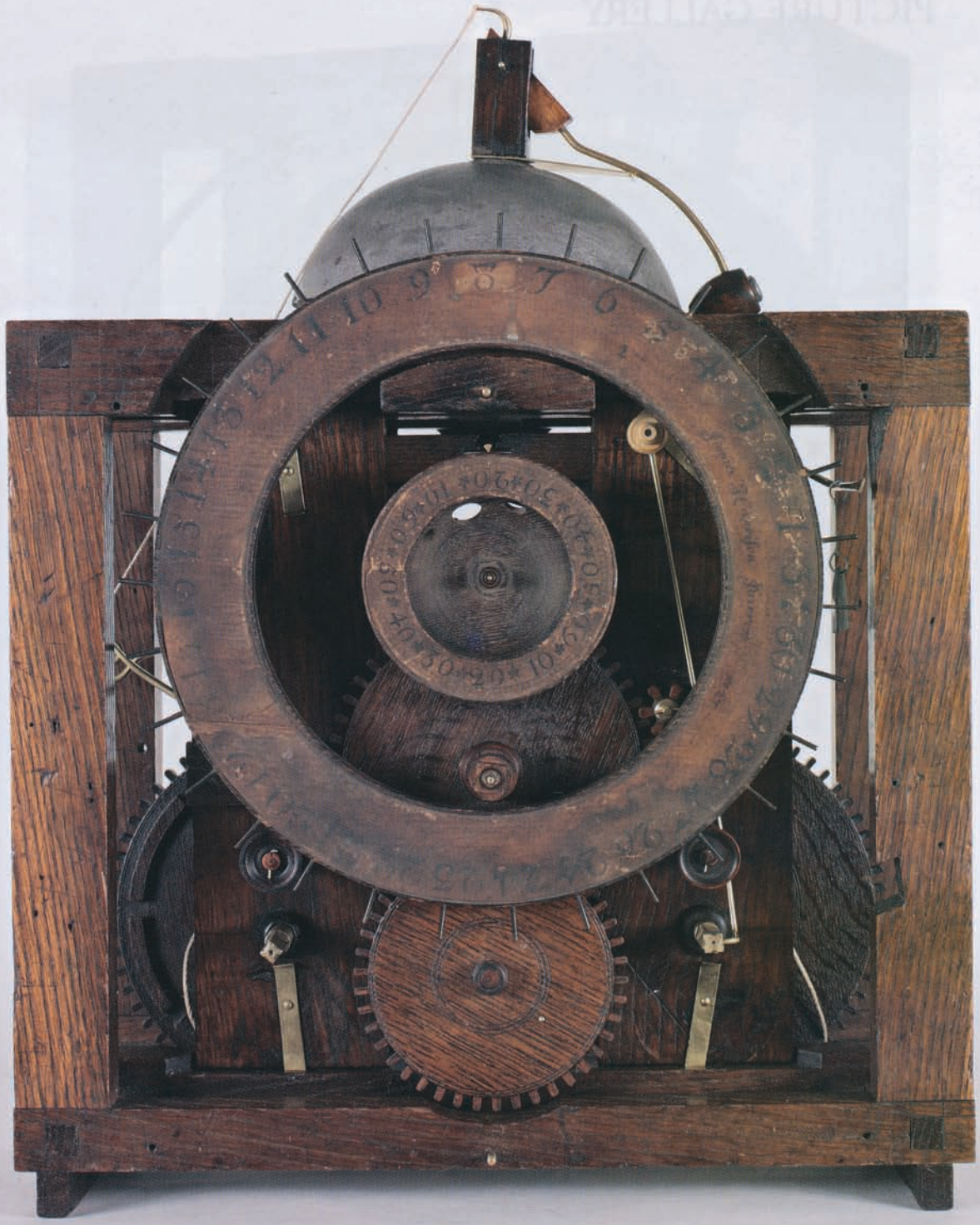
The pendulum bob was displayed against the black painted ground. Originally there would also have been a plate divided into divisions of a second for accurate time recording. The lenticle has at some time been covered by a wooden plate. Was the reason for this to hide the pendulum from prying eyes?

Pit-saw marks can be seen on the backboard of the case.

The decoration on the left and right case sides.

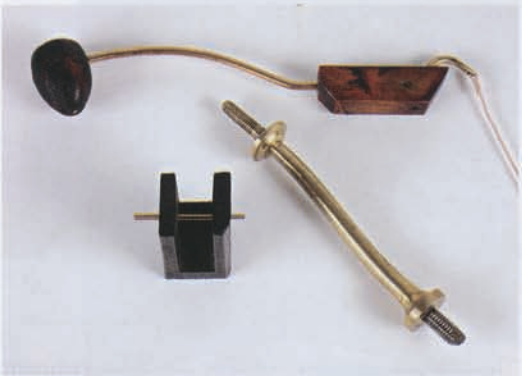
The decoration on the trunk sides around the door.

The dial board is of oak only ⅜ in. thick. The reverse is routed to only half this thickness to receive the calendar ring. The ground is black varnish, the carefully designed symmetrical decoration is of powdered gold and surely full of symbolism. The chapter ring appears to be a standard item supplied to the Harrisons. The feet have been sawn off and the ring fitted using brass pins.

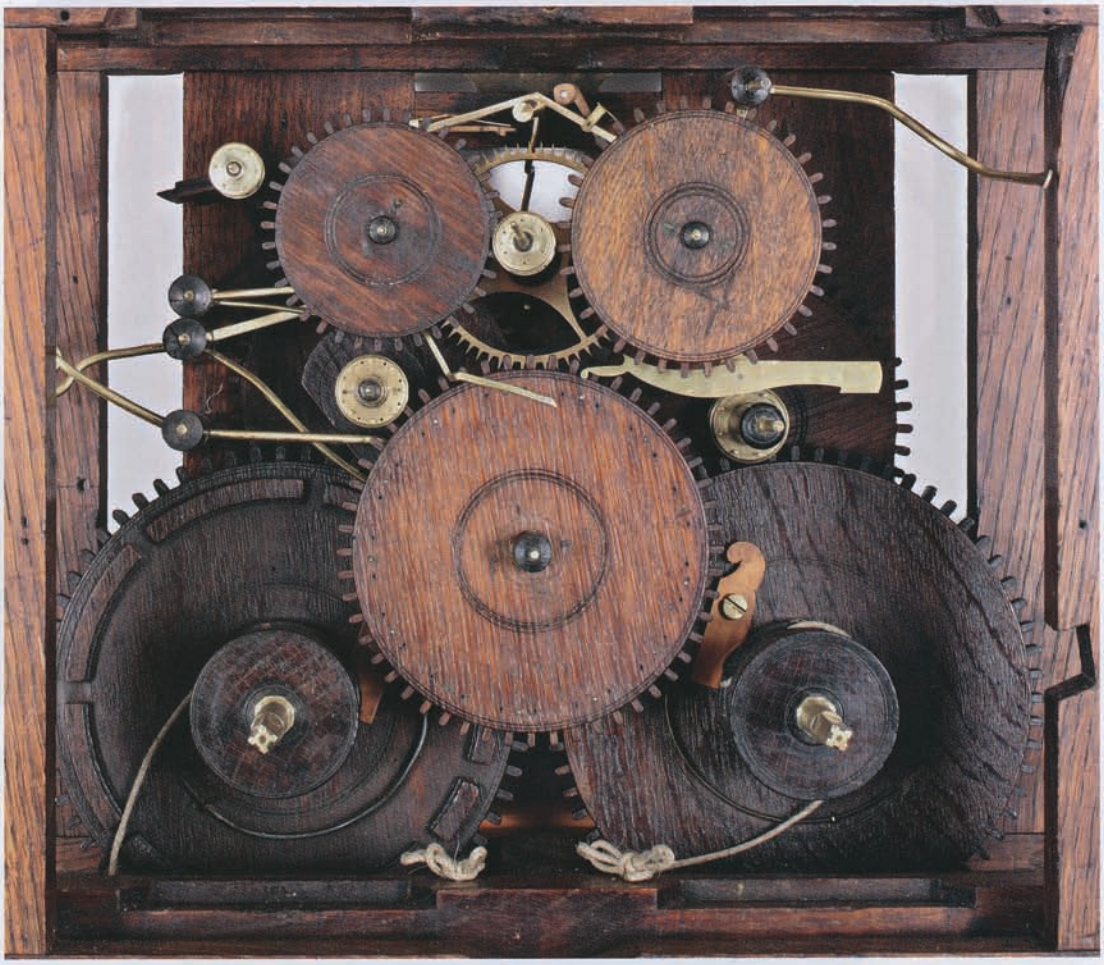


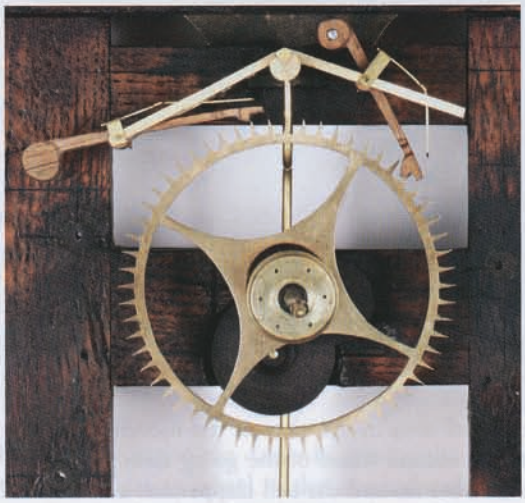
The movement, made in oak, has a frame 14½ x 12⅞ x 5⅞ in. (W x H x D). The wheel work is held between wooden plates located by brass latches. The large date ring is faced with paper and indexed by the pin on the lower calendar wheel (new) acting on the pins on the periphery of the date wheel. The seconds dial mounted on the escape wheel arbor is also faced with paper.

The paper facing to the date wheel is numbered, signed and dated in black ink. The paper facing on the seconds indicating wheel is also marked out in black ink for 2 x 0-60 seconds. This wheel, turned in one piece in the shape of a bowl with poising holes, acts as a flywheel for the escape wheel which rotates anticlockwise.



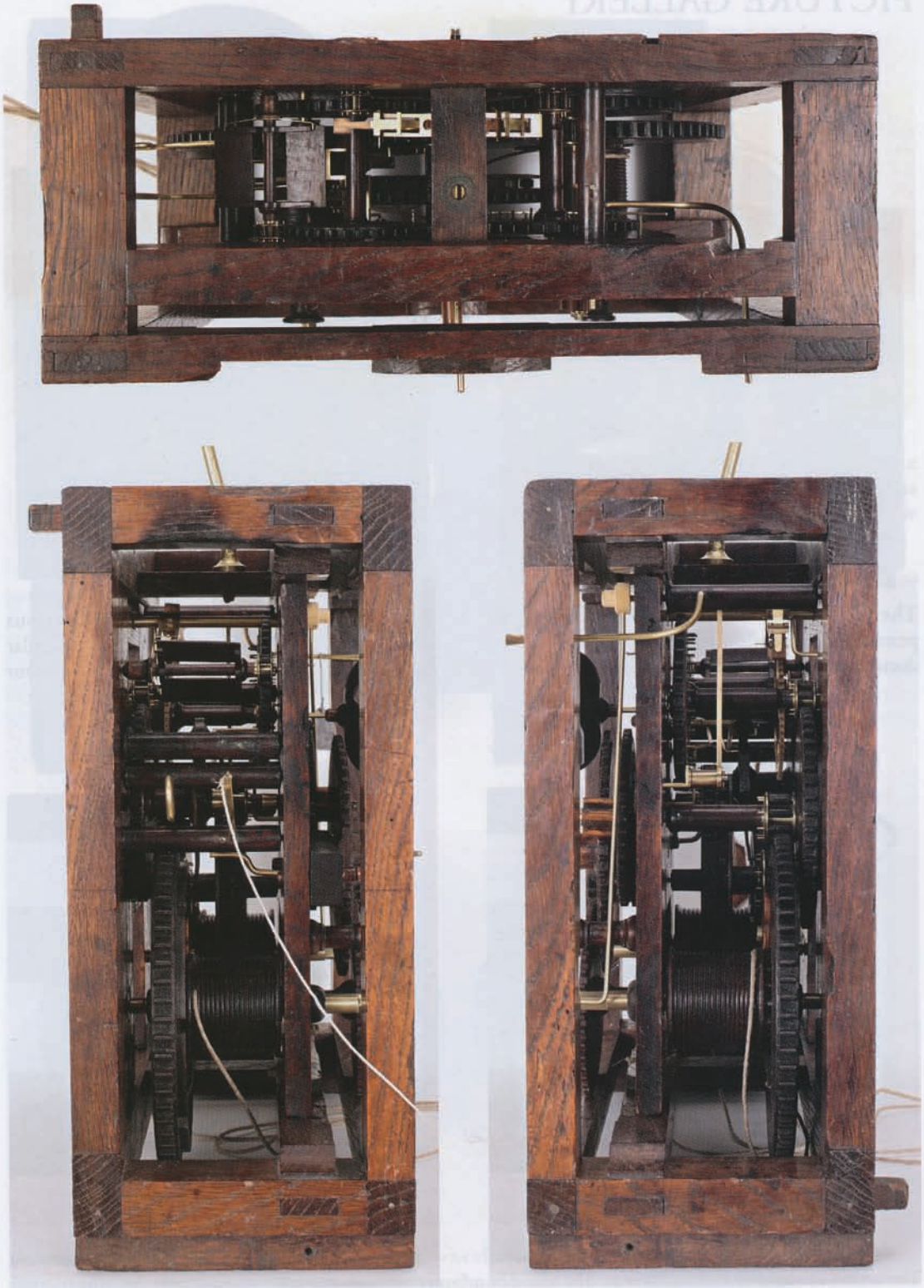
The motion work is driven using the combined pinion/wheel seen in the view of the movement (top). This pinion/wheel is mounted on the extended arbor of the second wheel of the going train. There is a friction spring behind the wheel. The diameter of the bell is 6½ in. and the bell clapper has a lead insert which means that it is rather heavier than expected. The winder is simply a superb work of art, made in brass and boxwood, a pleasure to behold, handle and use.





The movement with front plate removed showing the new escape wheel and Grasshopper escapement.

The new escapement is shown with the remnant of the original pallet arbor which had had an anchor fitted (see inset). The original escape wheel arbor was retained and the reconstruction was based upon comments in correspondence by later members of the Harrison family.



The top and sides of the movement.

PICTURE GALLERY

The back of the movement, with plain brass pendulum suspension bracket, a later alteration documented by Harrison.

Back of the wooden dial plate with various interesting features including the unused circular cut-out at the top and the groove cut-out in error on the right for the maintaining power shutter.

The action of the maintaining power. The wooden arbor is original, the brass work is new. An anti-friction roller for the escape wheel pivot is also visible, the second anti-friction roller is on the other side of the wooden bar.

The original strike work, the wheel has been fitted with new pins.

The great wheels, winding barrels with boxwood clicks and pulleys for the weight lines.

PICTURE GALLERY

THE GOING TRAIN

The great wheel, winding barrel and boxwood click. The wooden wheels in the clock are made in the expected Harrison fashion using teeth segments inserted into the rim of the wheel. The grain of the oak then runs the length of the tooth, to give the required strength.

The third wheel and roller pinion with a ring of pins for the maintaining power. The rollers in all the pinion assemblies are turned in self-lubricating lignum vitae.

The second wheel, with wooden roller pinions held between brass discs. The motion work is driven from this wheel using the driving wheel/pinion spring mounted onto the extended brass arbor.

The original escape wheel arbor and roller pinion, fitted with the new escape wheel of 60 teeth. The seconds indicating disk is mounted on the extended arbor.

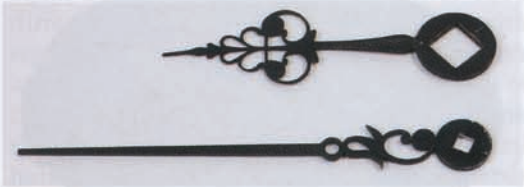
THE MOTION WORK

The solid boxwood pinion (not a roller pinion) with wheel for driving the motion work.

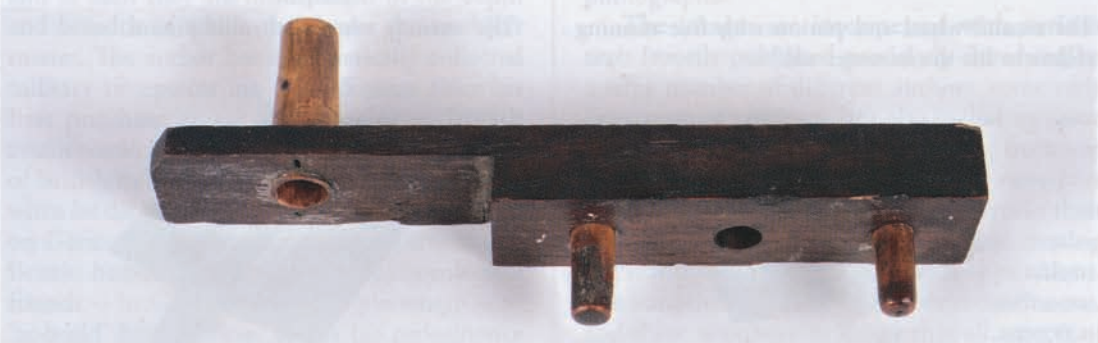
The rear of the minute wheel, showing the added lead for poising the wheel/hand assembly.

The repaired wheel for the hour hand, with a ring of pins to drive the date indexing wheel. Also note the lead insert to poise the wheel.

The wheel for the minute hand, driven by the wheel of the boxwood pinion/wheel assembly.



The hour hand has a brass insert inside the fitting square. The minute hand is a replacement.



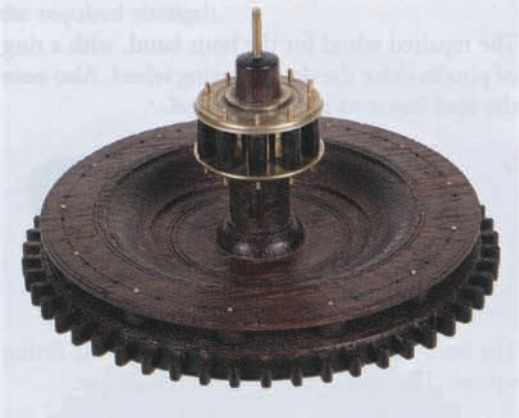
The motion work bridge, held in place by a shaped wedge which is visible in the three-quarter view of the front of the movement.

PICTURE GALLERY

THE STRIKING TRAIN

The great wheel, winding barrel with ratchet and boxwood click. The countwheel ring is turned in one with the great wheel.

The third wheel and roller pinion with double acting cam for the striking work.



The second wheel and pinion with free running rollers to lift the hammer tail.

The warning wheel and roller pinion.

Two views of the wooden fly. The friction spring and its collet are replacements.