OFFICIAL JOURNAL OF THE BRITISH HOROLOGICAL INSTITUTE

# The Horological Journal

AUGUST 2018
www.bhi.co.uk

# Old Rope, New Rope or New Chain?

*Fitting a Chain Conversion Set*

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When later rope-drive 30-hour longcase clocks come to me for attention, I usually recommend that a chain conversion set is fitted. I take this view because, apart from the problem of making a satisfactory joint in the rope, the fibres shed by the rope can be the cause of serious problems. Very often they occur in movements which are not otherwise ready for cleaning and **Figures 1–4** illustrate a movement suffering in this way. The fibres are released by the constant 'tearing' effect of the sharp sprocket pins as they enter and leave the rope during winding and unwinding. They are then blown through the movement by the striking train fly, the fibres attaching themselves to any component which has a

*Figure 1.*

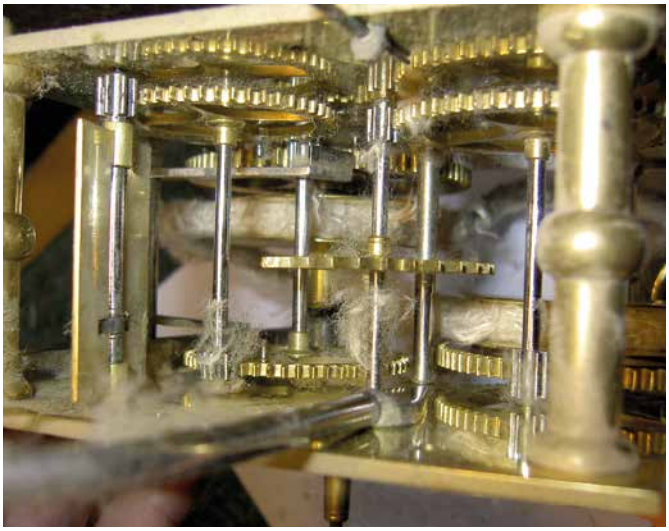

*Figure 2.*

*Figure 3.*

*Figure 4.*

Figure 5.

Figure 6.

Figure 7.

Figure 8.

slightly oily deposit, by being trapped between mating wheel teeth and pinion leaves, or perhaps even by static cling. Over time, the problem increases as the rope further disintegrates, as demonstrated in **Figure 1**. There are, of course, different types and qualities of rope available, but the 'softer' ropes, which grip the sprocket teeth more effectively, are more prone to the sort of problems encountered by the clock in question.

This white dial clock is signed 'Deacon, Barton' on the dial and is, of course, by Samuel Deacon (1742–1816) of Barton in the Beans, near Hinckley in Leicestershire. It is dated 1798 on the front plate and is, as is usual for Deacon, very competently made. However, it does not have the baluster pillars and other decorative features which he reserved for his more elaborate and specialised clocks. The movement, dial and case of this dainty and elegant clock are illustrated in *English 30 Hour Clocks* by Darken and Hooper.[1]

Everything, even the bell standard, was covered with intertwined fibres and the escape-wheel pinion had fibres pressed down hard into the roots of the leaves. The fibres may have also soaked away the oil from the pivot holes. Perhaps it is my imagination, but I have noticed that clocks which have run all their lives with rope drive tend to have less wear on the pinion leaves. This may be because they have been cleaned more often or that the fibres have protected the leaves.

The only way to fit a new chain sprocket is to bore out the centre pipe accurately on a lathe so that it is a correct fit on the great wheel arbor. Very often these arbors are tapered or barrel shaped, and this is how they should remain. There is no circumstance in which I would condone even dressing the arbor, and certainly not turning it parallel. This ensures that the original sprockets can be returned to the movement in the future if strict originality is desired. The removed sprockets should therefore remain with the clock, preferably by attaching them securely to the seat board.

There are several types of kit available for chain conversion. Those with circular steel clicks, **Figure 5**, are for earlier and high-quality movements. An alternative version has a separate spring operating on a pivoted 'triangular' brass click, **Figure 6**, and these, sometimes referred to as 'budget' conversion kits, are for later movements. Further options consist of stamped steel spiders with steel washers, **Figure 7**, or pinned cores with centre pipes, **Figure 8**. Both of these

are for converting the existing sprockets, with the end plates being reused. These options, however, mean that the original sprockets are destroyed. These kits usually come with sufficient matching chain for 30-hour longcase clocks, but the weight pulley is not included.

All the chain conversion sets shown here, or similar, are available from suppliers who advertise on internet websites.

A suitable lathe is necessary to carry out the conversion. Attempting the work with a drilling machine and taper broaches will usually result in sprockets which turn like a buckled bicycle wheel. The clock may work, but it is a sad sight to a good clockmaker.

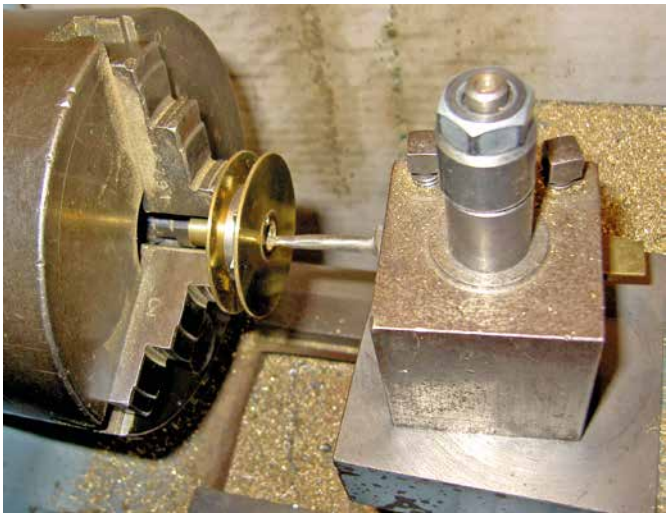

Figure 9.

Figure 10.

I fitted a conversion set with a 'triangular' click to the Deacon clock in question, and **Figure 9** shows my lathe set up ready for boring out the sprocket centre. This particular boring tool always remains in its tool-block for this purpose. The new sprocket is mounted in the lathe with the chuck or collet holding the long pipe. In other words, the back of the sprocket should be facing away from the lathe headstock.

The first step is to measure the smallest diameter of the arbor. The centre hole of the pipe is then opened up to this dimension with a drill mounted in the tail-stock. The angle of the taper is now estimated and this angle is set on the top-slide. The pipe can now be carefully opened up with the boring tool, noting how far the tool goes in before it stops cutting and remembering that the far end is at the right diameter. On trying the arbor in the hole, it is not too difficult to judge whether the angle is too steep or too shallow. For example, if the arbor is tight near the end being worked from and loose inside, the angle set on the top-slide is too small and needs increasing a little. On the other hand, if the arbor is loose at this end and tight on the inside, the angle of the top-slide needs decreasing. Small cuts and frequent checks are necessary at this stage. If the arbor is slightly 'barrelled', the trick is to take a little from the middle but not the two ends, never removing more than the greatest diameter. Proceeding carefully helps to ensure a good job. The fixed sprocket should be a tight fit and the winding sprocket should be an easy fit. Once a good fit has been achieved, the length of the sprocket pipe can be adjusted by re-chucking and machining the appropriate end. Note that if the length of the pipe nearest the great wheel is reduced in length, it will be necessary to open up the bore a little to compensate. The whole operation to achieve a really good result should take only about an hour or so. Finally, check the operation of the click against great-wheel crossings. It may be necessary to trim the click to obtain good contact and ensure correct operation. If this is necessary, I usually remove the click for this purpose.

Alan Midleton once showed me a nice clock by John Wyld (Senior) of Nottingham and I was dismayed to see that a previous clockmaker had reduced the great wheel arbors to fit the ¼in diameter pre-drilled holes of new sprockets. My own John Wylde clock has been abused in a similar manner, but in this case, although the arbor has been turned down, it fortunately still retains its taper and little has been removed. Having the right equipment doesn't mean that it should be used without thought. Once metal has been removed, it is gone forever.

As for the weight pulley on chain driven clocks, I prefer to use those with a rounded groove, **Figure 10**, as one would expect to find on a rope driven clock. Many chains have some natural twist in them and the rounded pulleys allow this to pass without a problem. Grooved pulleys intended for chain driven clocks tend to emphasise any slight twist when the weight is pulled up to the top.

The Deacon clock came to me with a new eight-pound weight which I considered to be far too heavy and which had probably contributed to the problem. When I returned the clock, I suggested to the owner that it would be better if it had a lighter weight. The owner then produced a very authentic weight of about three and a half pounds, saying that it had been with the clock when it was acquired. With this lighter weight, the clock runs beautifully and strikes the hours at an even rate. Why do some repairers imagine that a heavier weight is always the answer to every problem?

In this context, many Deacon clocks, including the clock referred to here, have a going train great-wheel which revolves once in only two hours. As such they need a smaller weight than a clock with a great-wheel which revolves in the more usual three hours. 30-hour clocks with a four-wheel going train may need a weight of about eight pounds as the great-wheel revolves only once in six hours. Some thoughtful makers provided a larger diameter sprocket on the going-train of these clocks to allow for this, and the striking side sprocket is often the usual size.

ENDNOTE

1. J. Darken and J. Hooper, *English 30 Hour Clocks. Origin and Development, 1600–1800*, (Woking: Penita Books, 1997) 245–6 (plates 4/80 and 4/81) and 354–5 (plates 7/58 and 7/59).