A Modern grandfather clock

This page offers tips to consider while assembling a German Hermle grandfather clock mechanism with three chimes. It is one of the best designs of chiming clocks, making it straightforward to assemble and adjust. Almost all chiming clocks work on the same principles, so the adjustments shown on this page are performed similarly on other chiming clocks. Hermle movements are often found in modern grandfather clocks made by Howard Miller, Sligh, and Ridgeway. These American companies manufacture the wooden cases and purchase the German mechanisms to complete the clocks.

This Hermle was made in 1983. It has an extra gear on the fourth wheel for the pinion gear that holds the second hand. Pay particular attention to the bushings and pivots of this pinion gear. Figure 1 shows the time train. Click on the images to view larger images in a new window. The escape wheel is not shown in this photo in order to show the pinion gear, but it is shown in the Figure 2.

Fig. 1

The chime train, shown in Figure 2, should be assembled before the time train because the fourth wheel is installed before the fourth wheel of the time train. There is a small brass pinion gear between the first wheel (with the cable drum, not shown here) and the second wheel. Lubricate the post and the hole of the brass pinion gear with grease before assembly.

Fig. 2

Install the fourth wheel of the strike train before installing the rest of the train. Figure 3 shows all the chime, time and strike trains in place. Notice in Figure 3 that the shaft of the third wheel in the chime train

(on the right side) and the lever for the strike hammers (on the left side) protrude beyond the pivots of the other gears.

Fig. 3

As you lower the back plate over the gears, insert the two longer shafts into their respective holes first. Then insert the lower posts of the back plate into the holes and install the nuts half way on the posts. Using a pivot locator (read my list of Clock Tools on this website), insert the gear pivots from the bottom up (from the second wheel to the governors and escape wheel), holding the plates in one hand like a sandwich. Press the plates together lightly as you guide each pivot into place. Press too hard and you could easily damage the smaller pivots. This requires patience and practice. In Figure 4, the plates are assembled.

Fig. 4

Figure 5 shows the shafts of the third and fourth chime wheels protruding through the front plate. Bushing for the fourth wheel has been replaced. When servicing a Hermle clocks with chimes, you need to pay close attention to the bushings for the third wheel on the back plate and the fourth wheel on the front plate: the bushing for the the third wheel wears in the direction of the fourth wheel, and the bushing for the fourth wheel wears in the direction of the fifth wheel. These two bushings are the most critical in this clock and require particular attention to detail. Wear in these two bushings usually causes the chimes to fail. Other worn bushings should be replaced, as outlined in my pages about bushings in this website.

Fig. 5

Figure 6 shows a view of the front plate after assembly.

Fig. 6

Figure 7 has a lot of information. First install the chime lift lever [A], followed by the stop lever [B]. Rotate the warning wheel until the pin is next to the governor [C] and install the stop cam [D] and the chime cam [E] as shown, tightening the screws on the cams.

Fig. 7

Rotate the strike gears until the star wheel has just released the lever.

Fig. 8

Rotate the strike warning wheel until the pin is next to the governor [F] in Figure 9. Then install the gathering pallet [G], as shown, using a flat-faced punch, like the one in Figure 10. You want the recess in the gathering pallet to be centered with the pin on the strike stop lever [H] in Figure 12.

Fig. 9

Fig.10

The gathering pallet was removed during repairs using two crowbars, like the modified screwdriver in Figure 11. This must be done very carefully, so as not to bend the shaft.

Fig. 11

The centershaft has a cam with four arms that lift the chime lift lever for the quarters. Rotate the centershaft until the longest arm on the cam releases the lever: this is the hour ("60") position. Place the hour wheel [I] onto the centershaft and the rack such that the rack lever is centered on the 11 o'clock position (the second deepest step on the snail [J]). Then place the washer and e-clip onto the minute wheel [under the arrow of J].

Fig. 12

The rear chime assembly is the most difficult part of this clock to assemble.

Fig. 13

Figure 14 shows in more detail how the parts go together.

Fig. 14

In the Whittington chimes position, the driver gear is tightened after the chimes have released the hammers in order, one after the other, from right to left.

Fig. 15

Figure 16 shows the Westminster chimes position, showing how the driver gear interacts with the chime drum for the different chimes.

Fig. 16

Under each hammer is a return spring that needs to be attached to each hook under it in Figure 17.

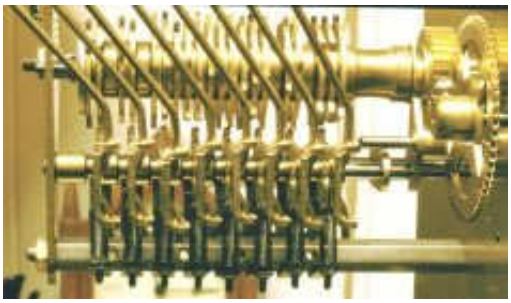

Fig. 17

The escapement needs to be adjusted so that the inside lock is small but visible, as shown in Figure 18. You should also try to make the inside and outside drops equal, as much as the design of the clock will allow.

Fig. 18

Many modern clocks, such as this Hermle, have removable first wheel arbors, making it possible to remove the first wheels without needing to take the entire clock apart. The first wheels in these clocks are installed last during assembly. Figure 19 shows a first wheel with the click and click spring externally mounted, a good design: this makes it possible to release the click easily in order to untangle a cable, for example. Many new designs have internal clicks, which are much more difficult to access. The cable has a plastic guard around it to prevent it from getting tangled, which works well most of the time.

Fig. 19

The tape on the cable was placed there to show how long the cable was when fully wound, in order to be able to adjust the length of the cable to the same position after assembly. The winding arbor and the stop gears are marked to show how they go together.

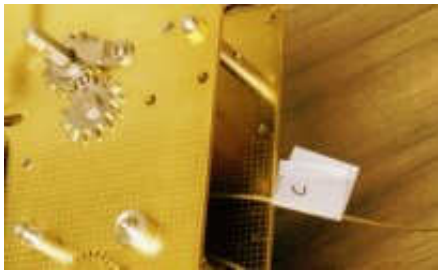

Fig. 20

The same procedure for the stop gears is performed for all three assemblies, so that the weights rise to the same height when wound. Figure 21 shows that the plastic cable guard is held in place with a pin on the plate. All three cables have plastic guards. The winding arbor on this particular clock is mounted above the stop gears in the middle, so that all three holes in the dial are in a straight line. This is only for cosmetic purposes.

Fig. 21

The nuts on the plates are loosened just enough to allow the two metal plates in Figure 22 to be inserted. These plates hold the tail ends of the cables

inserted. These plates hold the tail ends of the cables.

Fig. 22

Figure 23 shows a rear view of the completed clock. One more detail to remember is that the pulleys should each be disassembled and cleaned. Sometimes the pulley shaft needs to be polished. Then lubricate with graphite grease before assembly.

Fig. 23

Other modern grandfather clocks work on similar principles, such as the Urgos grandfather clock in Figure 24. It looks different, but the adjustments to the chime and strike mechanisms are similar. One very important problem to consider in this Urgos clock is the second wheel in the time train. The second wheel has the driver gear for the center shaft. The first wheel rotates in a clockwise direction, causing the bushings of the second wheel to wear towards the right side. Since the center shaft is on the right side of the driver gear, there is frequently too much depthing of the driver gear into the center shaft gear when the bushing wears. This may cause the clock to stop. The bushing on the front plate for the second wheel often needs to be replaced.

Fig. 24

Whereas the Hermle clock has a chime detent cam in front of the clock, the Urgos clock has a chime detent lever between the plates. The fifth wheel (or warning wheel) should rotate by about a quarter to a third of a turn when the pin on the fourth wheel is released and the chimes go into warning.

Fig. 25

American furniture companies like Howard Miller and Sligh, both of Zeeland, Michigan, and Ridgeway, a division of Pulaski Furniture in Pulaski, Virginia, manufacture the wooden cases and purchase the mechanisms to complete their clocks. Most mechanisms in their clocks were made by Hermle, Urgos, and Kieninger, in the last thirty years. Hermle mechanisms have been the most competitive and are therefore most frequently found in modern grandfather clocks in the United States.

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