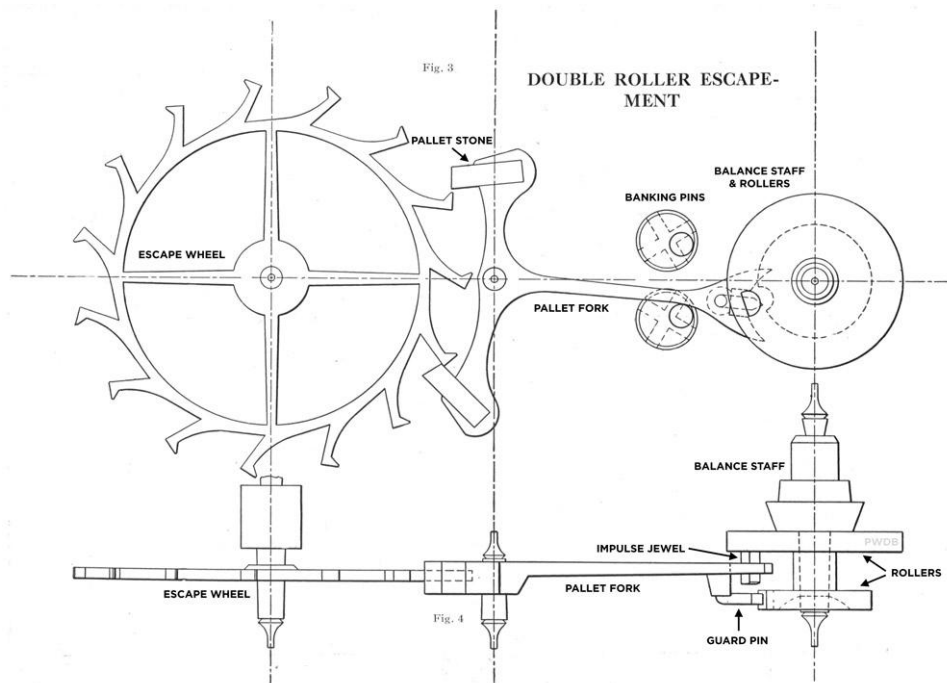
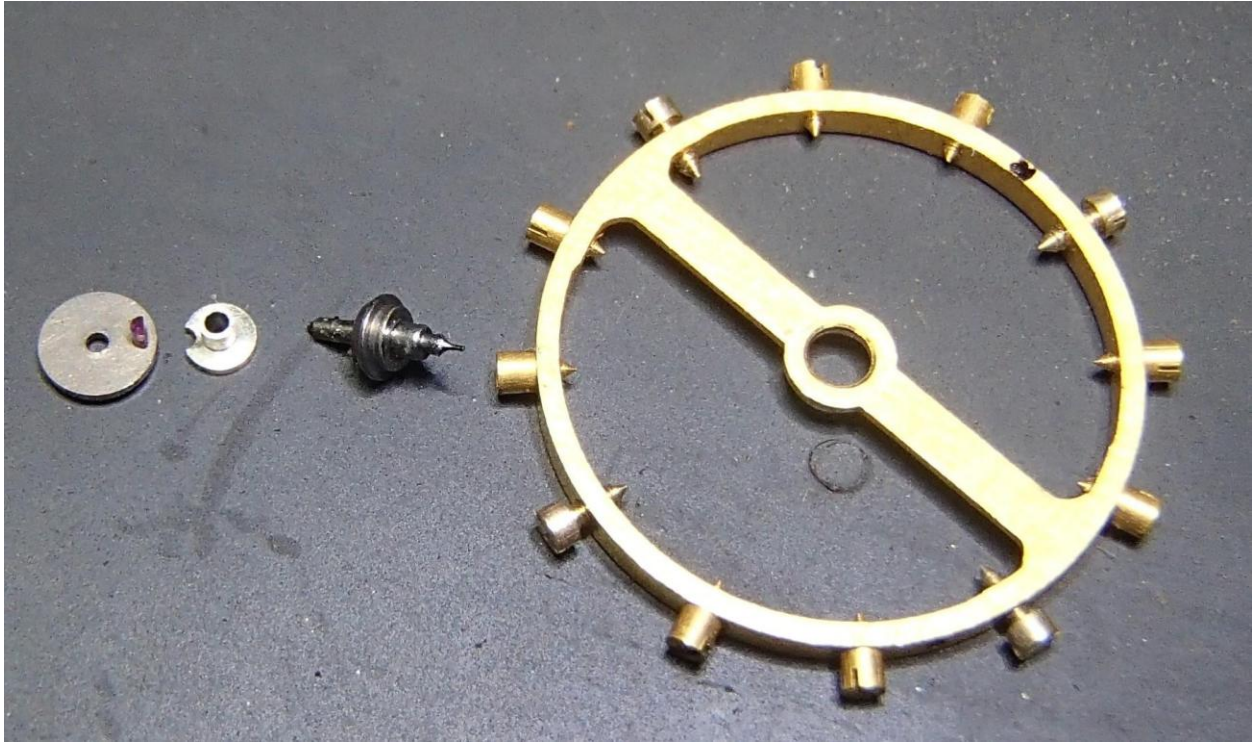


Tightening Roller Tables to Balance Staff

1 The Big Picture — Why We Reduce a Roller Table Hole





When you fit a **roller table** onto a **balance staff**, they are held together by creating a friction fit. That means the hole in the roller table must be just slightly smaller than the staff seat so it grips tightly.

If the hole is too large:

- The roller will be loose.
- The impulse jewel may shift.
- The watch can lose impulse, timing stability, or even stop.

When loose, most roller tables only need to be reduced **0.01–0.02 mm**. That is about one-hundredth of a millimeter — thinner than a human hair.

So we are not crushing metal, we are gently moving it.

The goal:

- Tight fit
- Roller centered
- No visible distortion
- No cracks

Now let's walk through how this is done.

2 The Concepts — How We Close the Hole

What Is Happening Physically?

When we “close” the hole, we are not drilling or cutting.

We are **displacing metal** — pushing it inward so the diameter becomes slightly smaller.

Think of tapping the edge of a soft washer. The material flows inward.

Now let's look at the two main methods.

Method 1 — Using a Round-End Punch (Most Common)

This method is similar to closing a worn pivot hole.



Setup

1. Place the roller table flat on the die plate of a staking tool.
2. Use a **solid round-end punch**.
3. The punch tip should be **two times the diameter of the hole**.

Why two times the diameter?

Because the force will spread evenly around the hole.

Too small → dents.

Too large → little effect.

Procedure

- Tap lightly.
- Check fit frequently.
- For more closing effect, close from **both ends**.

If done properly:

- It will be difficult to detect that it has been closed.
- The hole reduces evenly.
- The roller remains centered.

Pause here and remember:

We are working in hundredths of a millimeter. Light taps win.

Material Matters — Brass vs Steel

Not all roller tables can be adjusted the same.

Brass (Often Nickel Plated)

- Soft metal.
- Easy to deform.
- Can smash flat if hit too hard.

These require very light tapping. If you are unsure of the material, check the roller with a magnet. Just don't forget to demagnetize it.

Strike too hard and:

- The roller distorts.
- The jewel slot may shift.
- The piece becomes unusable.

Tempered Steel Rollers

- Much harder.
- Can tolerate firmer tapping.
- But very hard steel can crack or break.

So both materials extremes require care when reducing the hole.

Soft = smash risk.

Hard = crack risk.

That's judgment work.

Method 2 — Three or Four-Cornered Punch

This is a very effective method. Use the 3 or 4 corner punch.



Instead of compressing the entire circumference, you:

- Place 3 or 4 equally spaced indentations around the hole.
- These create small internal burrs.
- The burrs grip the staff.

Advantages:

- Keeps roller centered.
- Provides controlled tightening.
- Less overall distortion.

You are essentially creating microscopic gripping points.

Very clever approach but can usually be detected.

What If the Hole Becomes Too Small?

Important rule:

✗ Do NOT broach the roller hole larger.

If the fit becomes too tight:

- Turn down or grind the balance staff slightly.

Why?

The roller must remain perfectly concentric.

Broaching can:

- Create eccentricity.
- Ruin balance geometry.
- Cause timing instability.

The staff is easier to dimension accurately than the roller.

Remember that.

3 Important Details — The Fine Points That Matter

- Only reduce **0.01–0.02 mm**.
- Always test fit frequently.
- Support the roller perfectly flat.
- Never allow the roller to tilt while staking.
- Close evenly from both sides when needed.
- Watch for plating cracks in nickel-plated brass.
- Inspect under magnification after closing.
- Ensure the impulse jewel remains square to the roller.

After fitting:

- The roller should press on firmly.
- It should not rock.
- It should not require excessive force.

If you need heavy pressure to install it, you went too far.

4 Arbitrary but Useful Details

- Older American rollers were often softer brass.
- High-grade Swiss balances often use hardened steel rollers.

- A polished punch tip leaves fewer cosmetic marks.
- A properly closed hole is almost impossible to detect visually.

The roller table is small, but it controls impulse.

Impulse controls amplitude.

Amplitude controls rate stability.

Tiny geometry.

Big consequences.