

Illustrated construction manual: The Wimshurst Machine

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https://michelswunderland.de/solderiron/wims.html#section_a



The following tools are helpful for a successful assembly:

- Solvent-based adhesive for most bondings
- 2-component adhesive (e.g. Stabilit Express), gap-filling
- Plastic glue (e.g. Ruderer L530), suitable for joints with other materials
- Superglue for special cases...
- Adhesive film
- Steel ruler - for measuring and guiding the craft knife
- Slotted screwdriver
- Scissors - a decent pair!
- Key file and 600 grit sandpaper - for working on hardened glues on open edges
- Sharp craft knife
- Tweezers for handling small parts
- White lacquer, black felt-tip pen and gold lacquer pen for painting open edges
- Paper towel for instant removal of blobs...
- Toothpicks and needles for the targeted application of adhesives
- Spatula for spreading glue over a large area (base plate)
- Clamps, scales and weights (e.g. books) for pressing glues.

Part A - The plinth



The parts required for steps 1 to 7 to create the base.



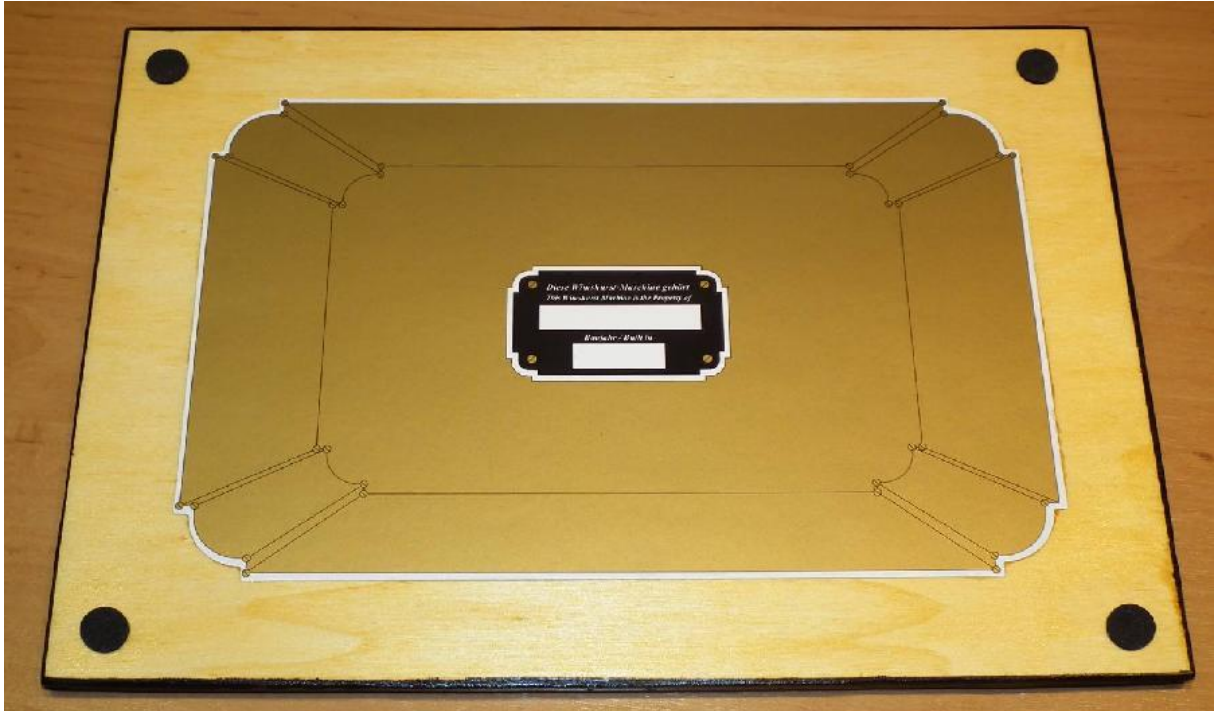
The picture shows the base after completing step 4.



Steps 5 – 7: Before gluing around the base with the edge trims, it is recommended to align the glued upper and lower parts congruently and let them dry well under weight.

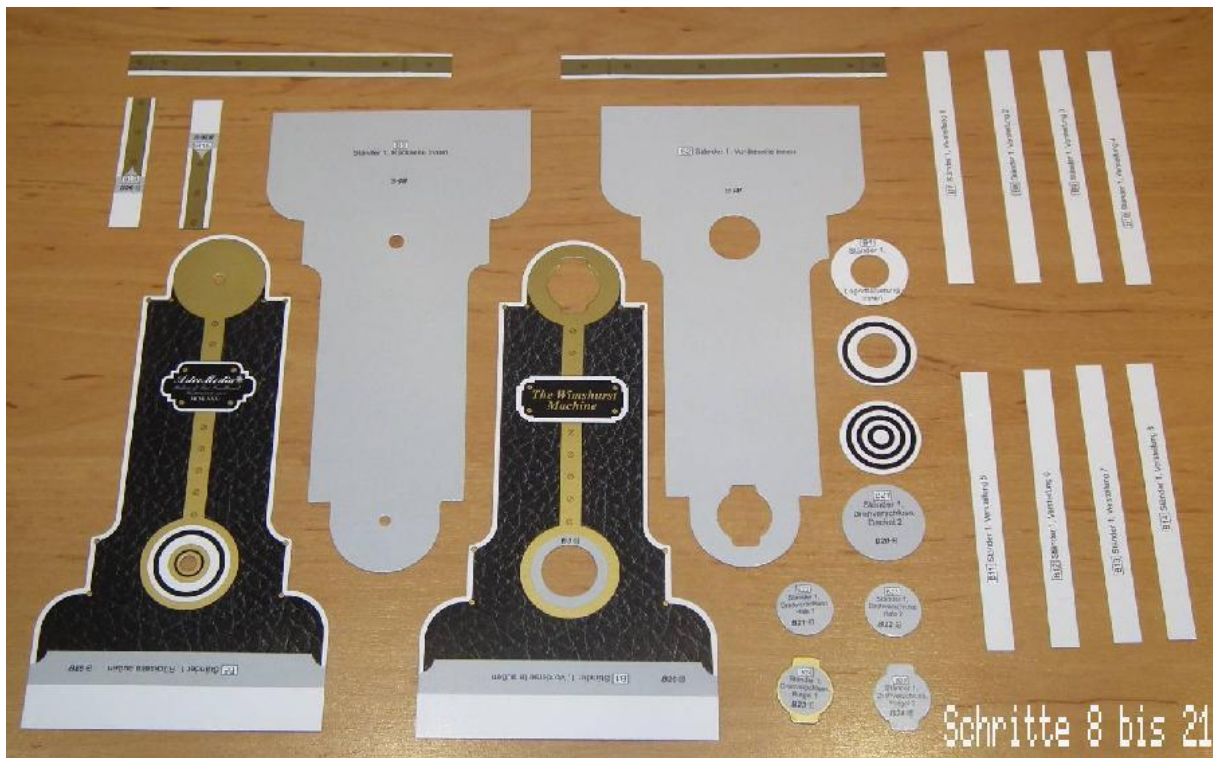


To improve the stability during operation, the base can be glued to a plywood plate (about 7-10mm thick). The optical adaptation of the wooden plate is done by means of shellac and black staining of the previously chamfered edges.

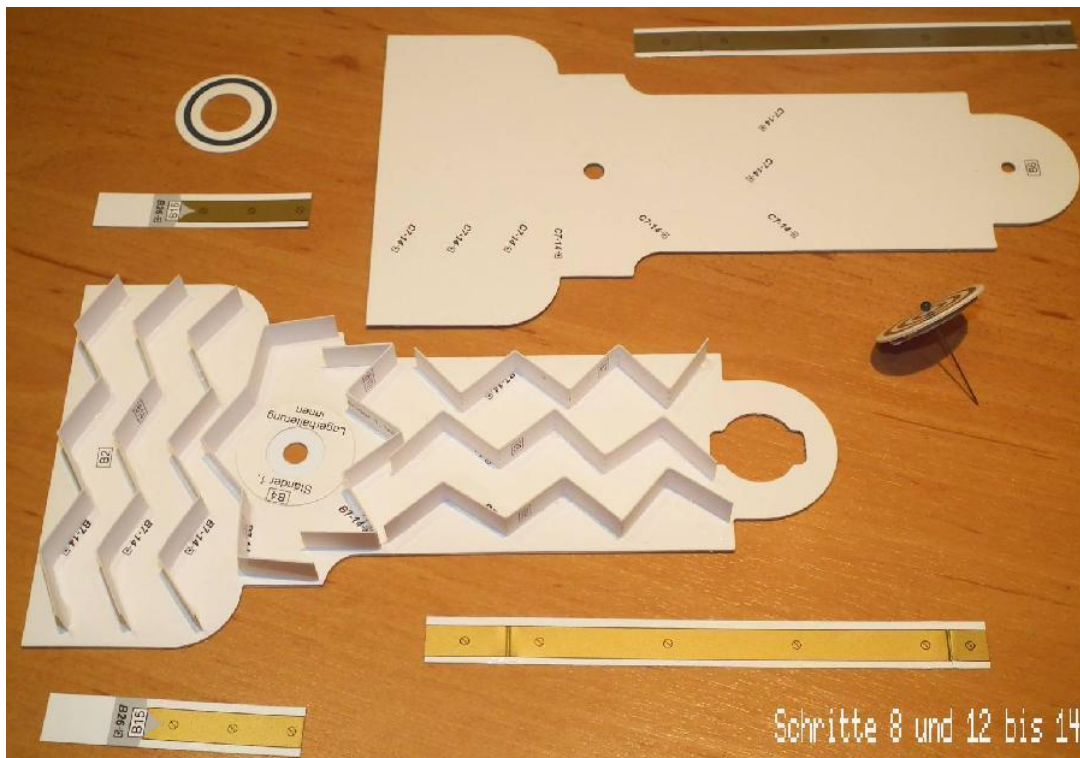


In this version, the outer part of the base is glued to the underside of the wooden panel. The corners are covered with foam rubber to prevent the base from slipping during operation.

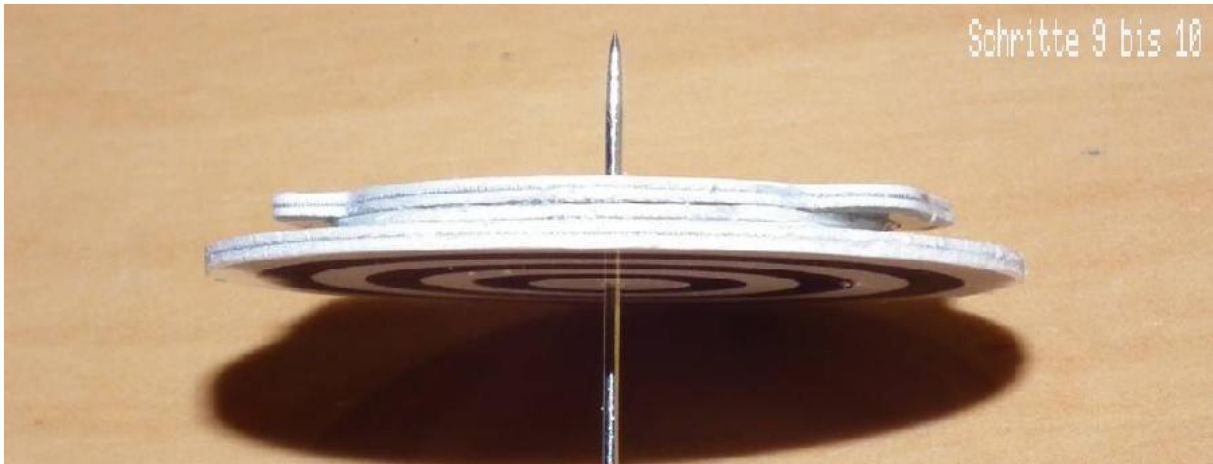
Parts B & C - The Stands



Steps 8 – 21: Since the two stanchions are identical except for the bow covering on the head, both stanchions were built at the same time.



Steps 8 & 12 – 14: The internal structure of the stands is similar to that of the base - sandwich with stiffeners. On the right in the picture is the twist lock already made according to steps 9 and 10.



Steps 9 and 10 of the instructions describe the construction of the twist lock.



Steps 15 & 16: Before attaching the edge trim, it is bent and folded accordingly.



Steps 17 - 21 describe the construction of the second stand - analogous to the first.

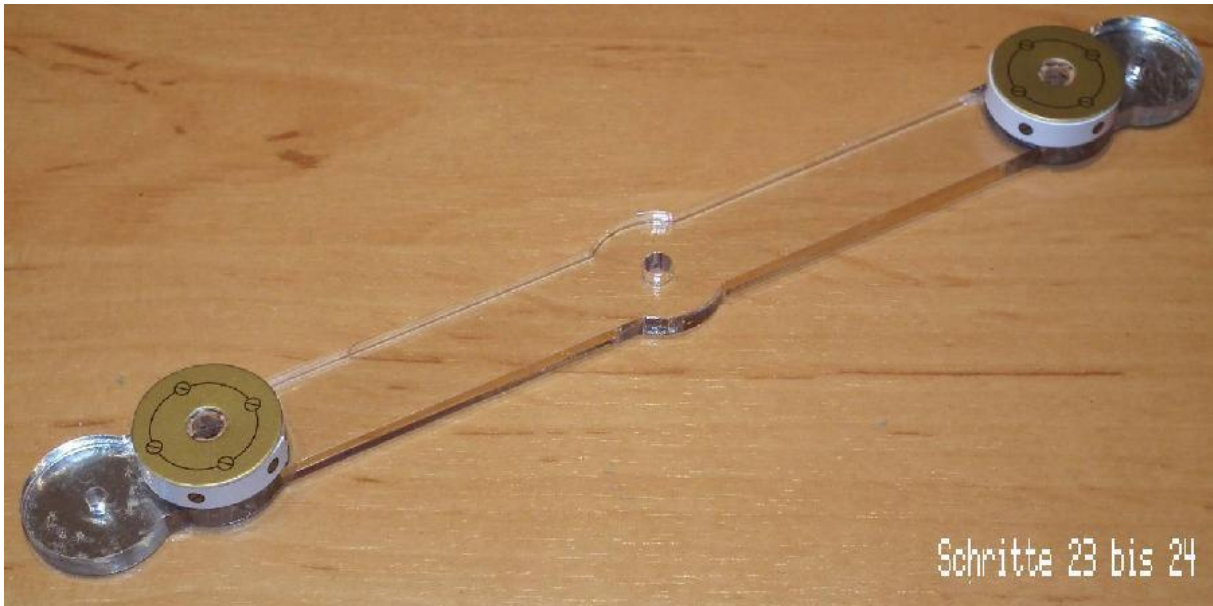
Part D - The Traverse



Steps 22 – 24: The truss consists of a manageable number of parts and is quickly assembled.



Step 22: The axle-box lining placed around the cork disc(s) is secured with a small rubber ring until the adhesive sets.



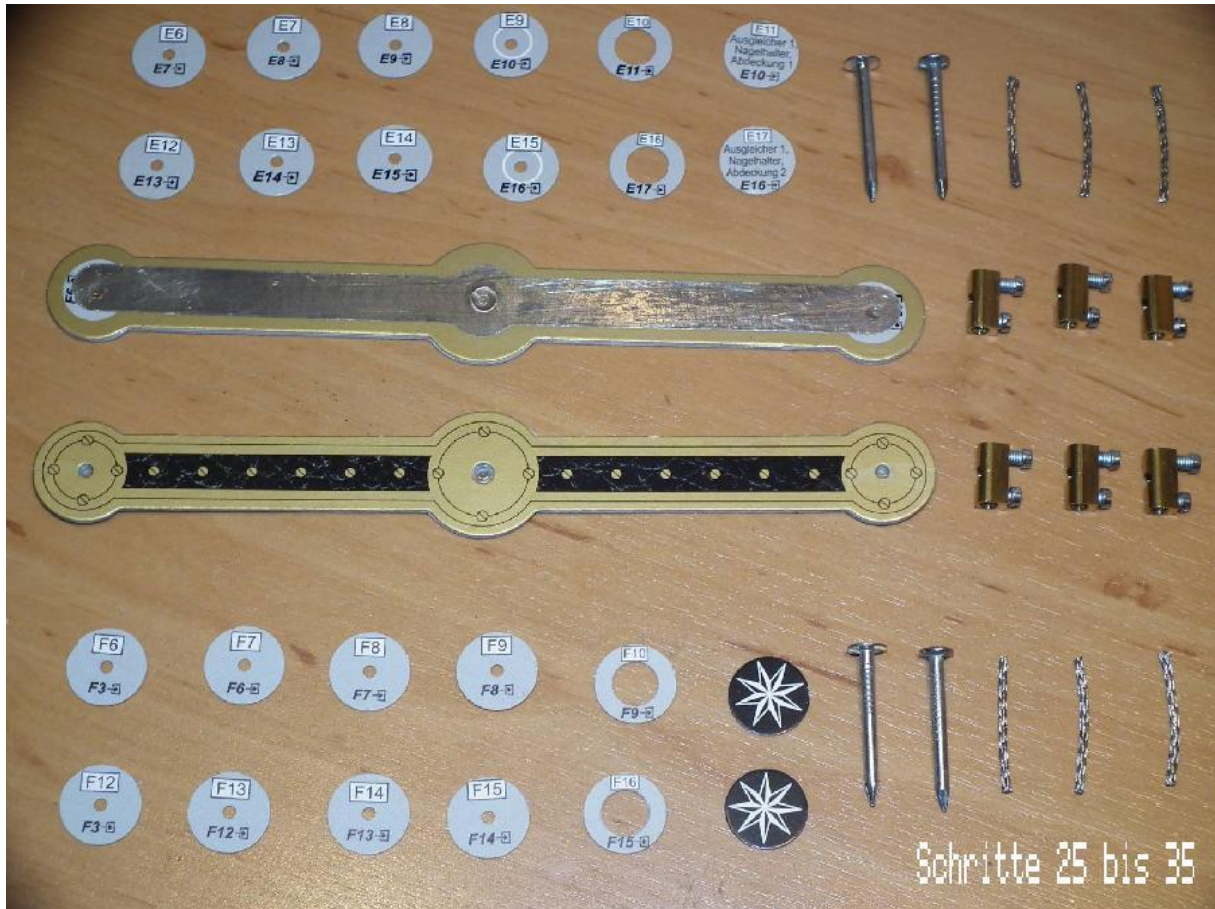
Steps 23 & 24: Contrary to the instructions, a plastic adhesive (Ruderer L530) was used to glue the cork discs, which also bonds excellently with other materials such as wood, metal and even glass.



Step 24 of the instructions describes how to apply the aluminium foil to the traverse. In order to simplify the process, it turned out to be useful to first roughly cut out the required pieces of foil from the support and then pull off the unused edge with tweezers.

If you then bend the support down under the required parts, the required pieces of film can be lifted off without any problems.

Parts E & F - The balancers



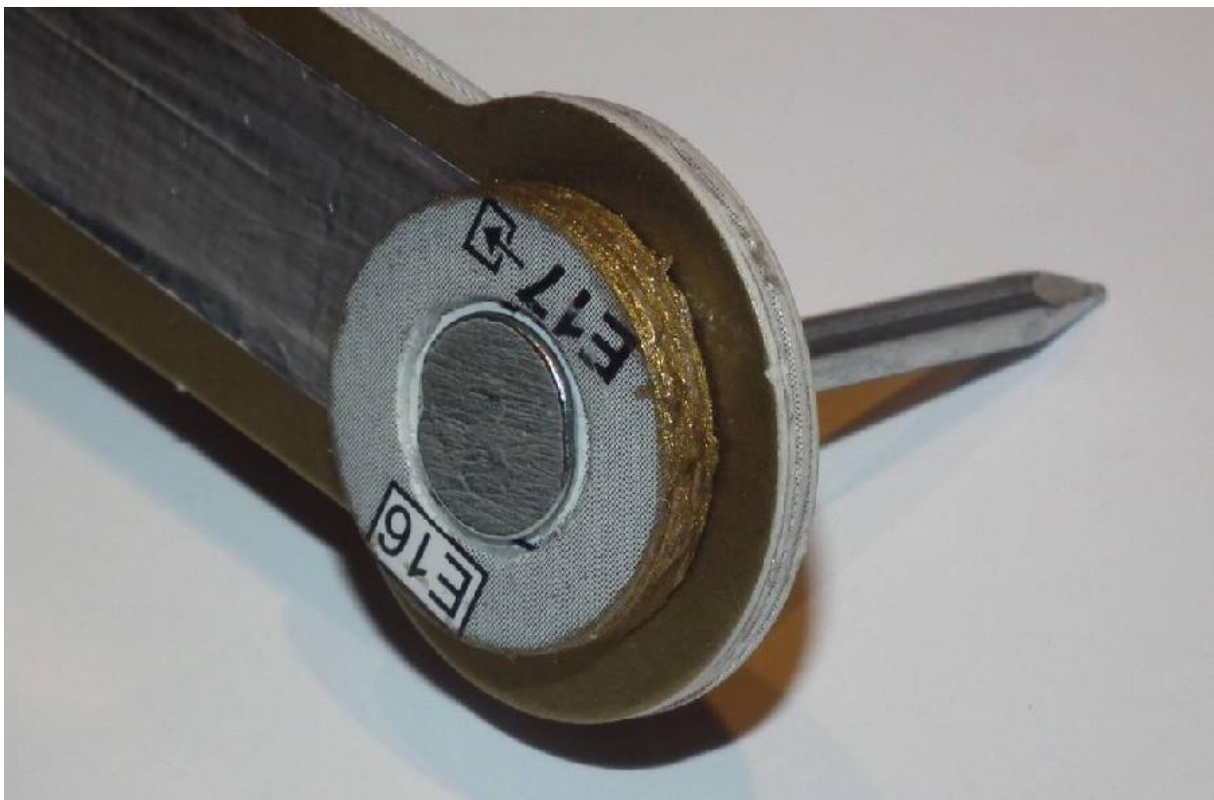
The assembly of the two identically constructed balancers is quickly done if their individual parts are ready for this. The picture shows the parts needed for **steps 25 to 35**.



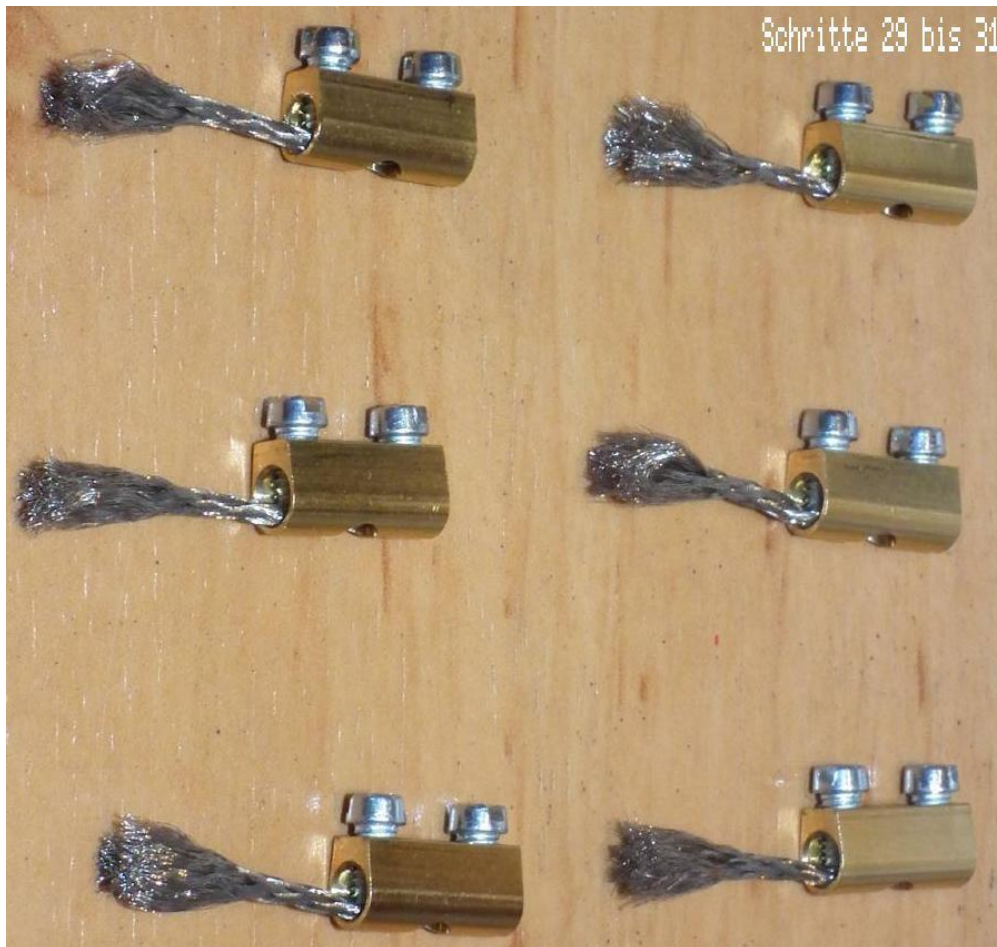
Colouring the edges of the equalisers in gold improves the visual impression considerably.



Steps 27 and 28 describe the sandwich assembly of the nail holders.



Before attaching the cover and before attaching to the leveller, the open edges of the nail holders can also be made gold-coloured.

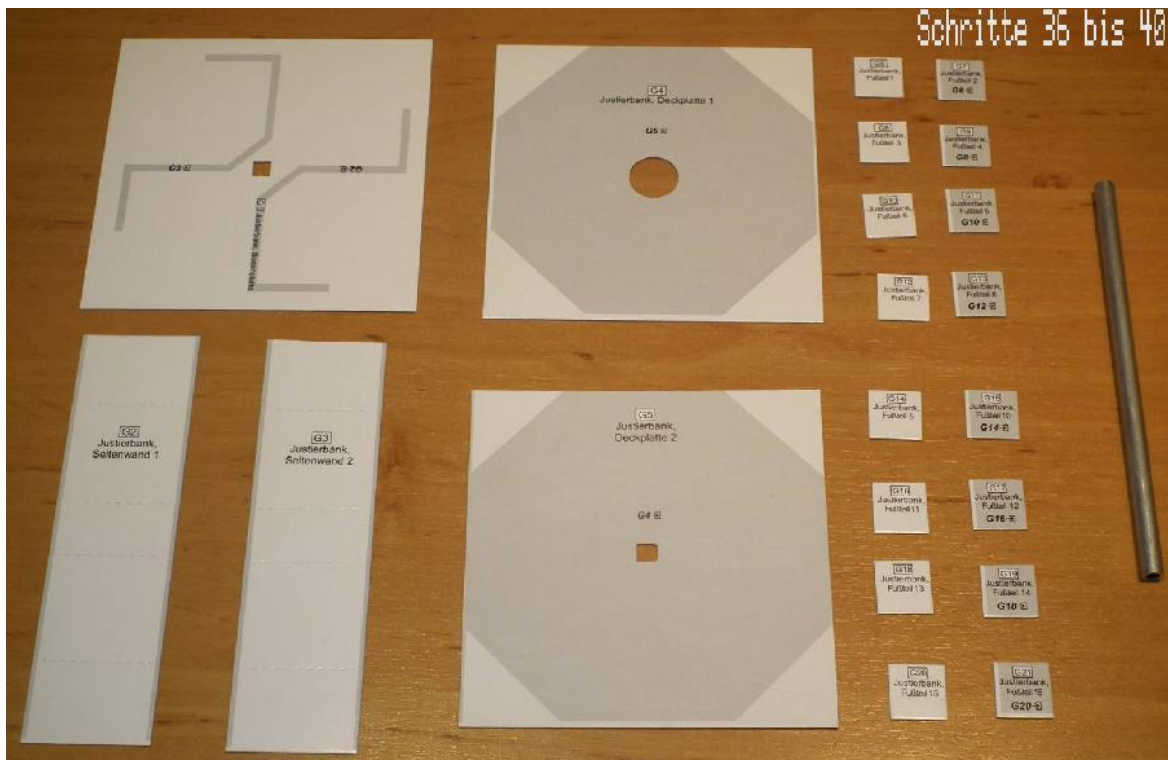


The total of six brush contacts required for the Wimshurst machine were manufactured according to steps 29 to 31.



Step 32: With the completion of step 32 or 35, the attachment of the contact brushes, the production of the two compensators is completed.

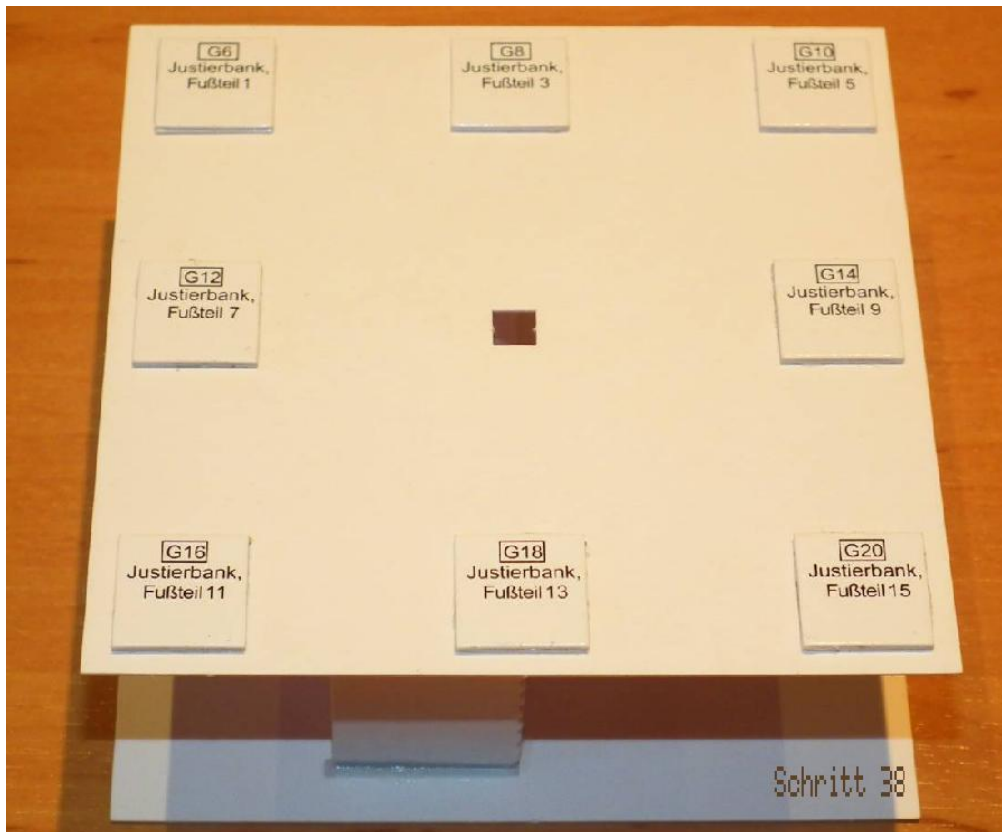
Part G - The Adjustment Bench



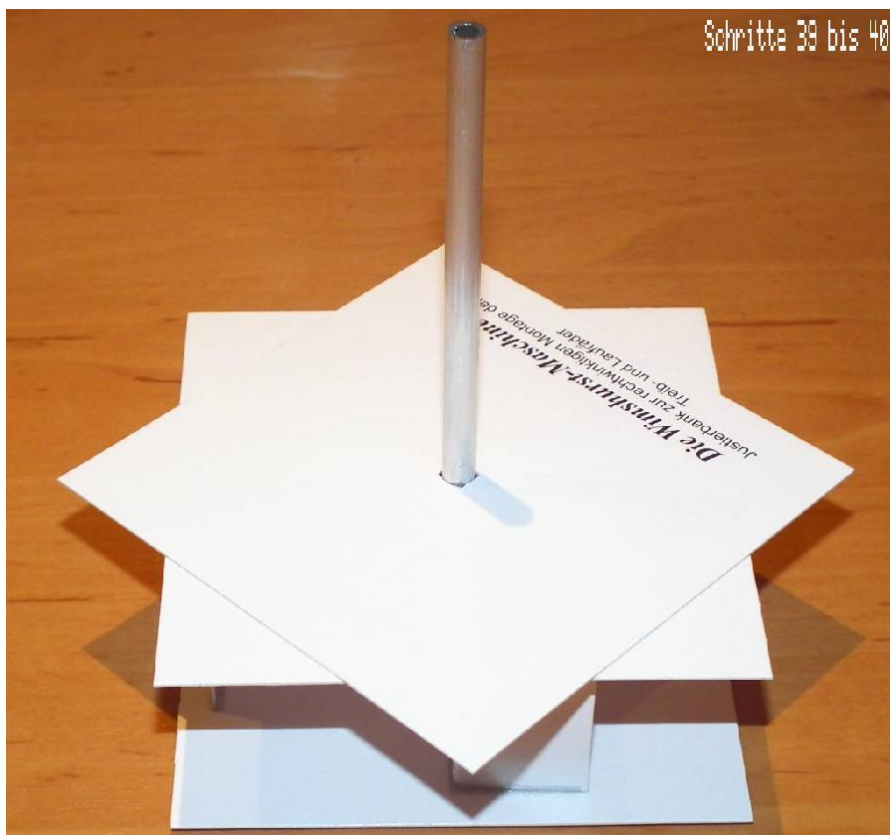
The assembly of the adjustment bench is done according to **steps 36-40**. It is used for the right-angled alignment of the hubs and pinions.



Steps 36 and 37 of the instructions describe the assembly of the base and top plates and the side walls of the adjustment bench. Allow to dry well before starting step 38.



Step 38 - Two plaques make a foot piece



Steps 39 & 40: By moving the second cover plate accordingly, it is possible to align the aluminium tube exactly vertically. A mini spirit level is helpful for alignment.

Part H - The lamellar discs



Making the lamellar discs requires some patience and exact work, based on the description for **steps 41 to 44**. The lamellas are lifted on the support with a craft knife at one corner and then attached to the round disc (which is fixed on the template) with the help of tweezers.

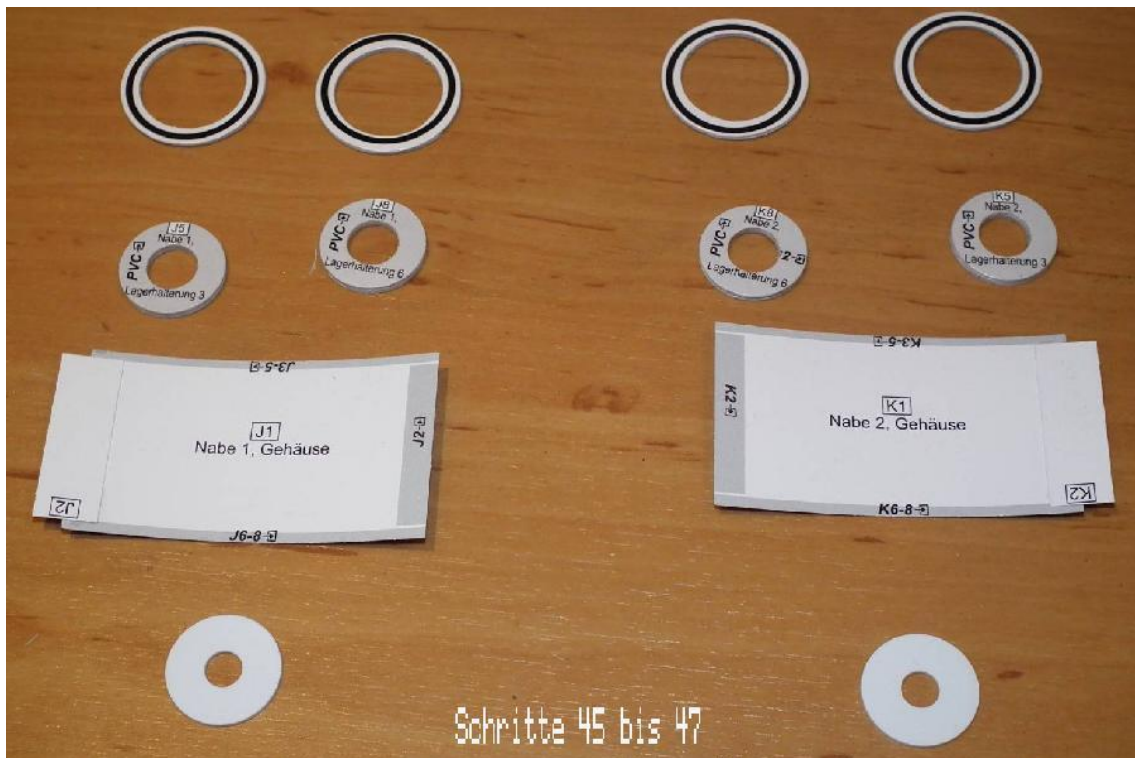


The result of steps 43 and 44.

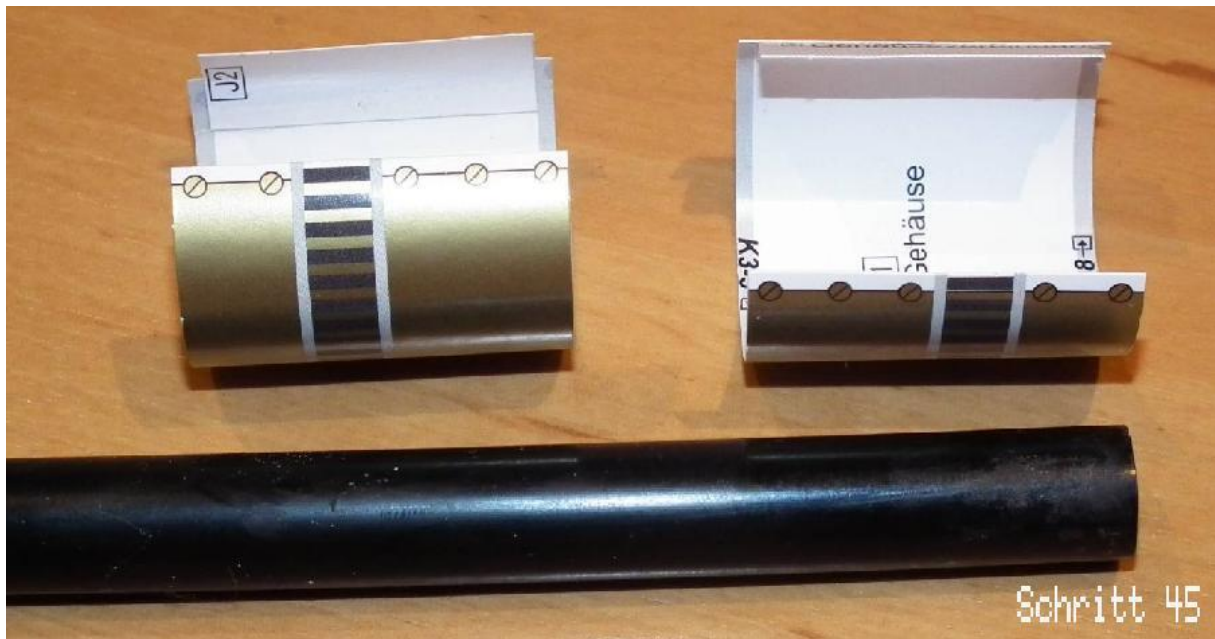
Parts J & K - The hubs



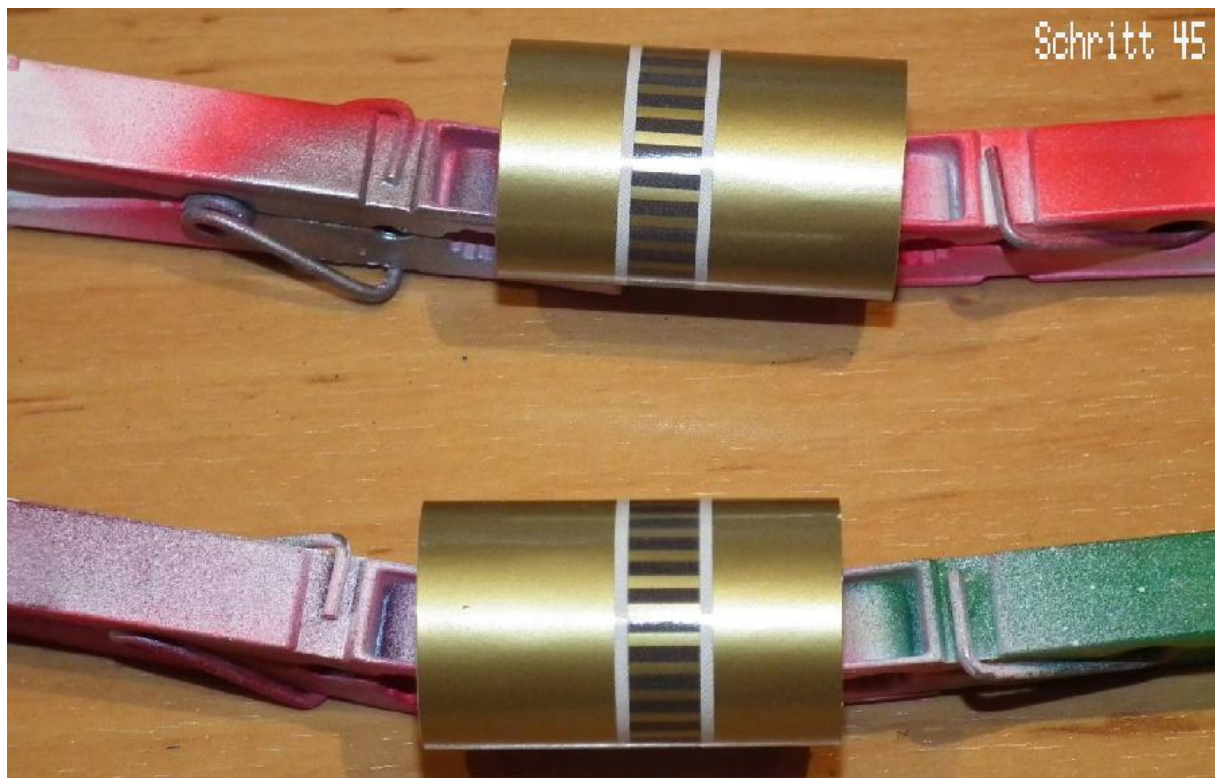
The parts required to build the hubs according to **steps 45 to 54**. Not shown are the PVC bearing washers required in steps 49 or 54.



Steps 45 – 47: Here, the sequence of steps in the construction of the hubs was slightly deviated from the construction manual...



In **step 45** the hub body is glued to a cylinder. This can be done quite easily if you first nestle the hub body against a thin tube.



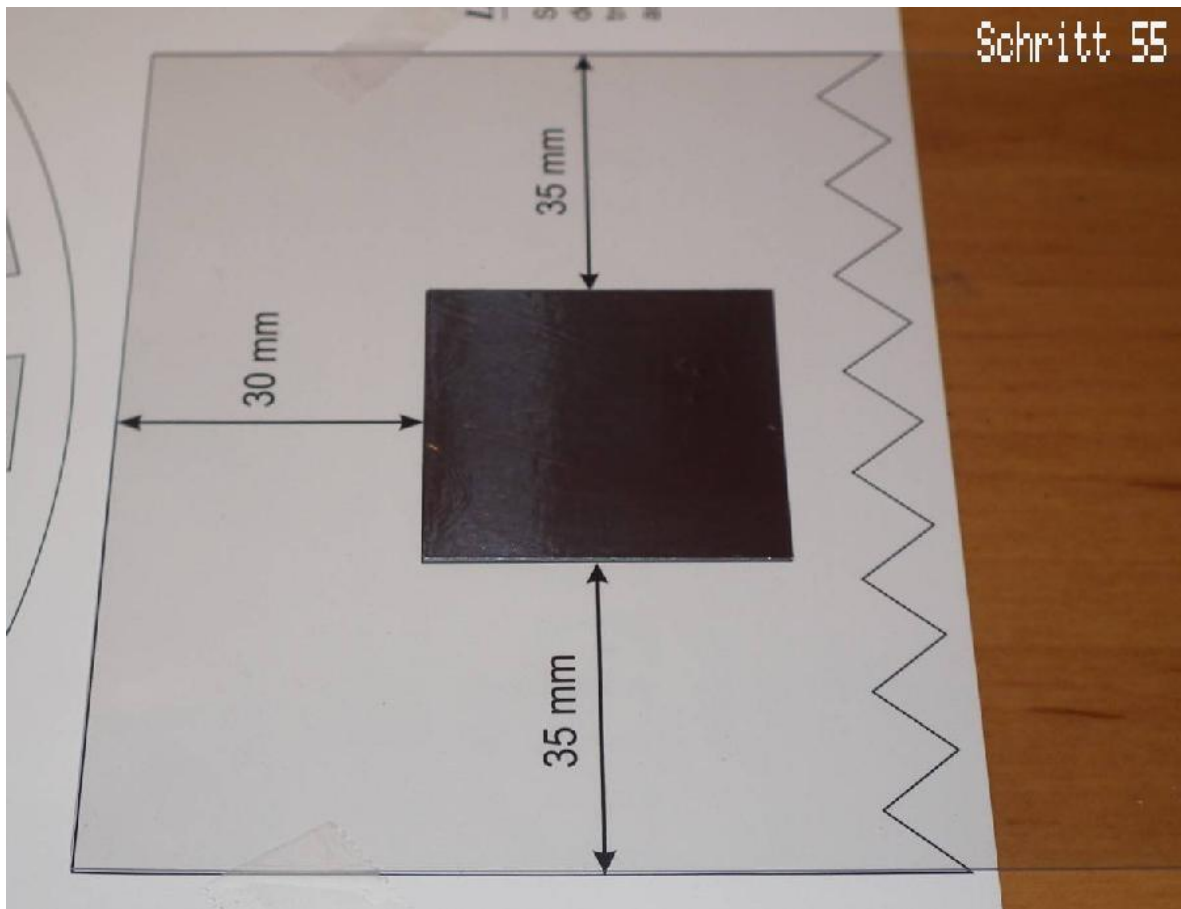
Step 45: Until the glue is completely dry, it is fixed in place with clothes pins.



Steps 46 & 47: After the impellers have been made and fitted, the bearing brackets are made and glued into the hub. It is advantageous to fix the glued joints with small rubber rings.

The result of the procedure described in steps 48 and 49 for gluing the hubs to the disc wheels can be seen in the picture shown in step 79.

Parts L & M - Preparation of the Leiden bottles and the driving wheels



Step 55: The capacitor electrodes of the Leiden bottles are glued to the transparent PVC blanks according to the template.

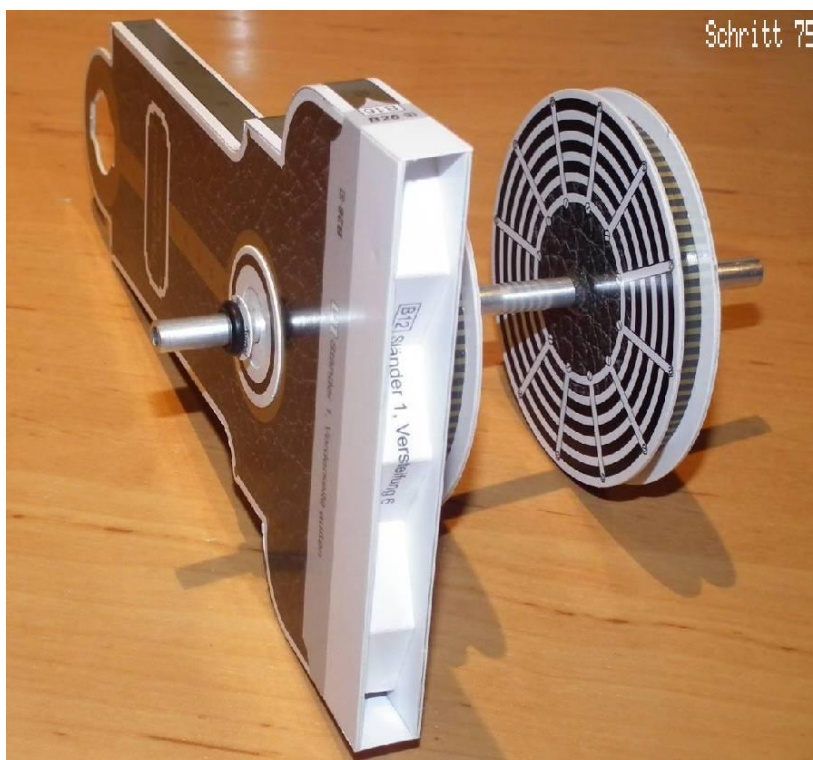
The creation of the drive wheels will not be discussed further here, as this is sufficiently illustrated in the instructions by an exploded view (Fig. 6). The appearance of a driving wheel is shown in the picture in step 75.

The tubes of the Leiden bottles are made analogous to the principle used in the construction of the hubs. They are rolled according to the instructions and glued at the end. The glueing (oarsman L530) is fixed with waesche clamps until hardening.

Part N - The Crank

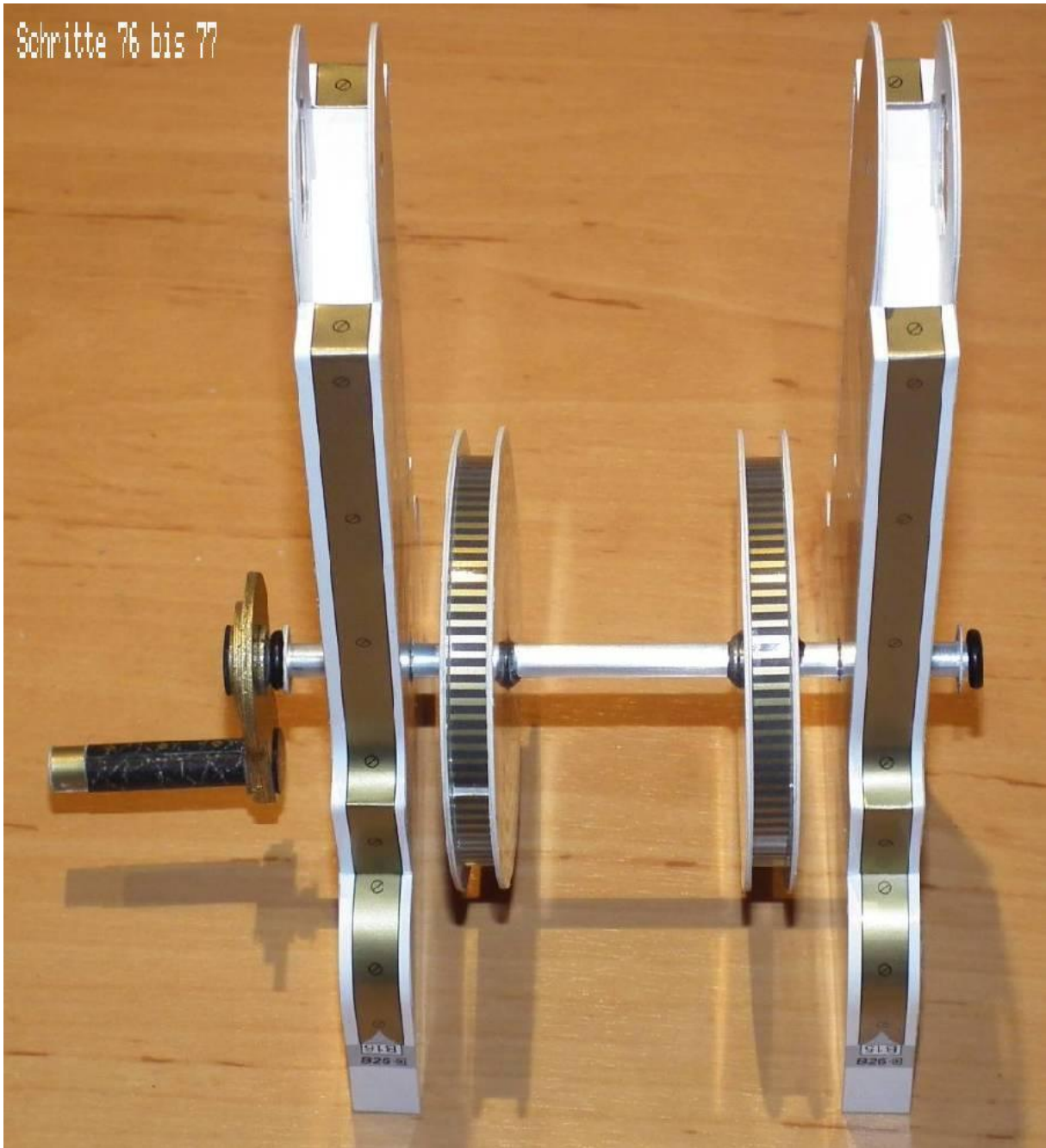


The crank made according to **steps 69 to 74**, the individual layers of which were given a golden colouring on the edges before gluing. The wooden axle in the inner part of the handle should be glued in place with Stabilit Express or an equivalent 2-component glue.



Mount the drive shaft according to **step 75** of the instructions in only one of the stands at first.

Schritte 76 bis 77



Steps 76 & 77: Assembled drive unit consisting of shaft, drive wheels and crank between the two stands after completing step 77.

Stabilit Express or an equivalent 2-component adhesive should be chosen for the connection between crank and shaft.

Part N - The assembly of the prefabricated parts

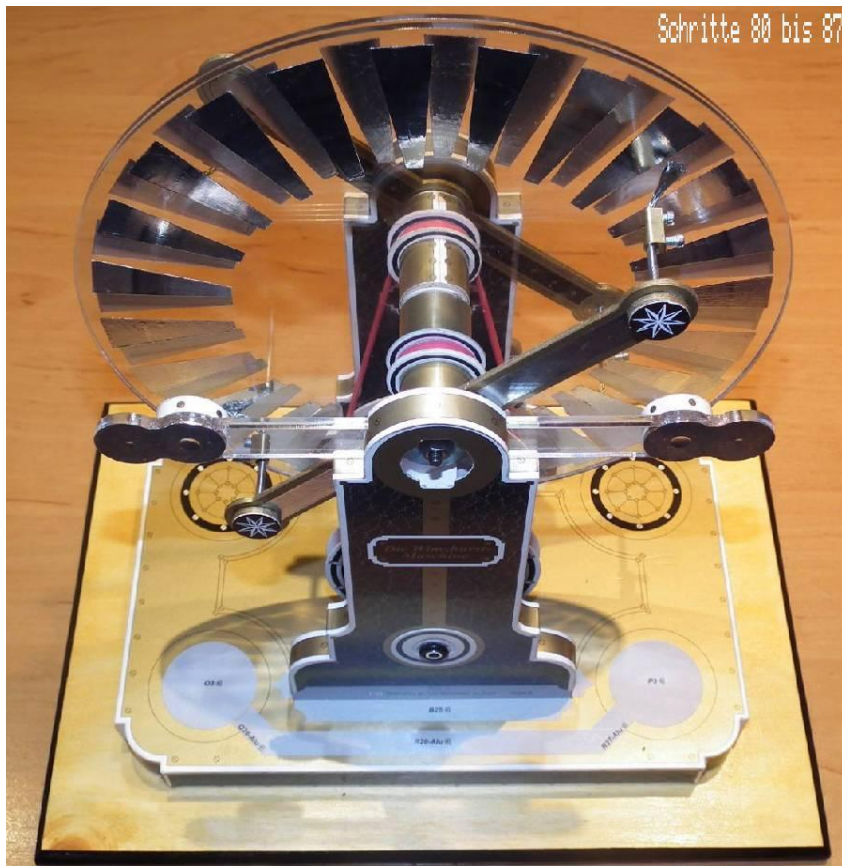


Step 78: The drive unit and the stator are only loosely inserted into the base. They will be glued in place later!

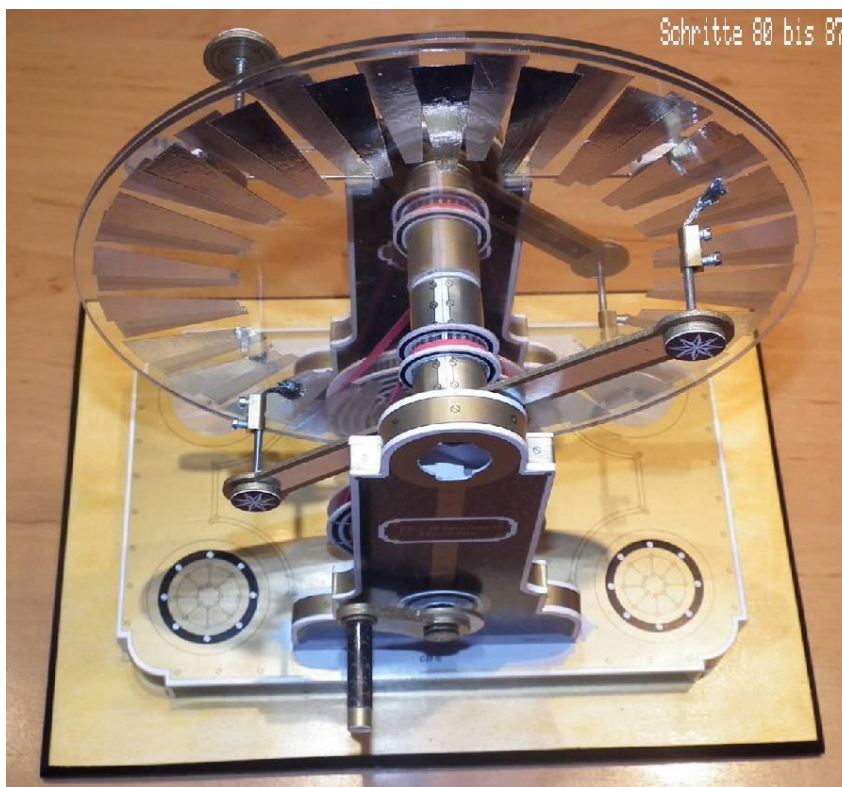


The discs with the glued-on hubs are assembled into a unit by means of the axle (aluminium tube, 84mm) and a PVC disc (between the discs) as described in **step 79**.

It is advisable to check again whether the discs do indeed run without wobbling and do not touch each other when turning on the axle. If necessary, straighten the discs or use another PVC disc between the discs.

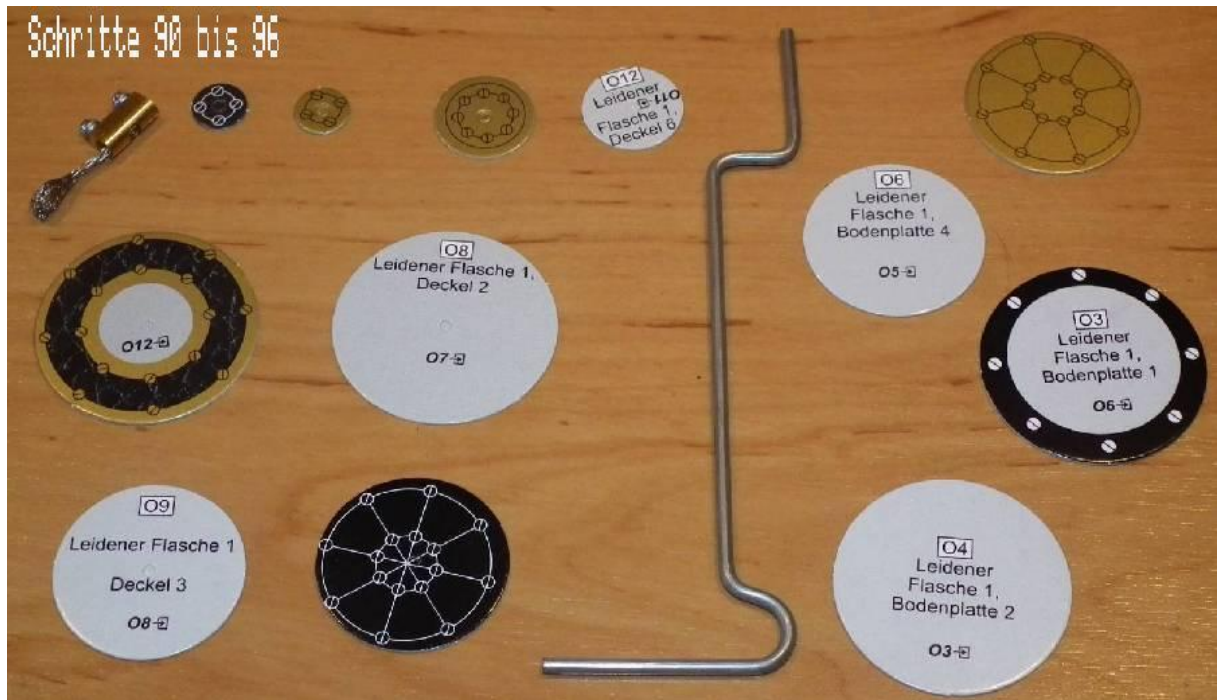


Steps 80 to 87 describe the installation of the disc unit and the balancers in the stator. The picture shows the result of this battle from the crank side.



To illustrate the whole thing again from the opposite side.

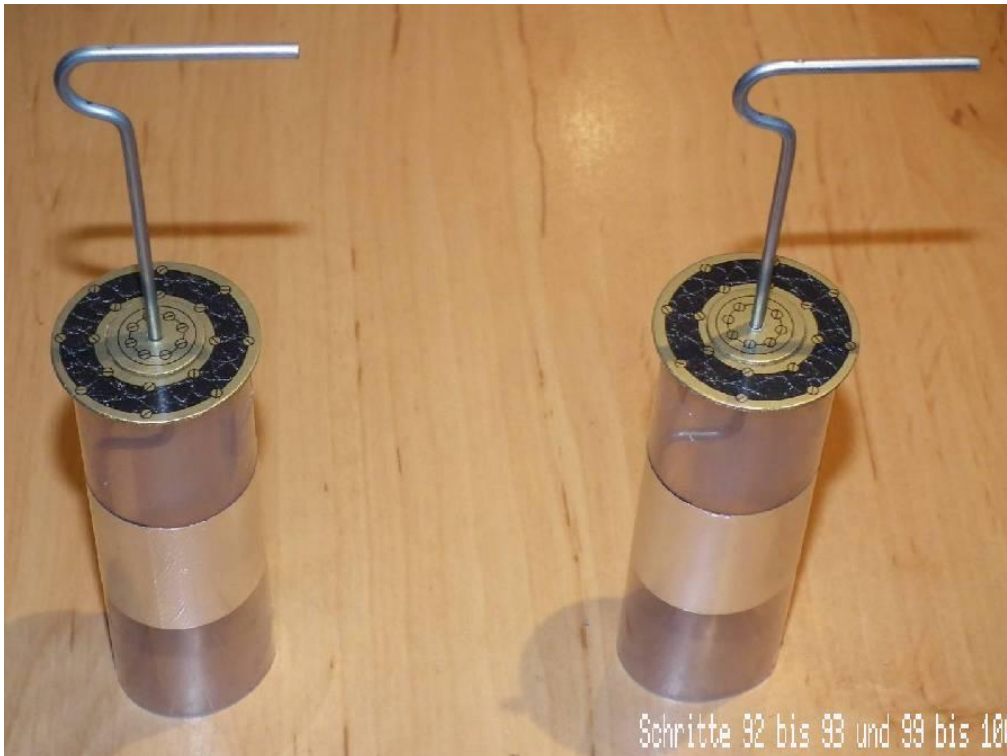
Parts O & P - The Leiden Bottles



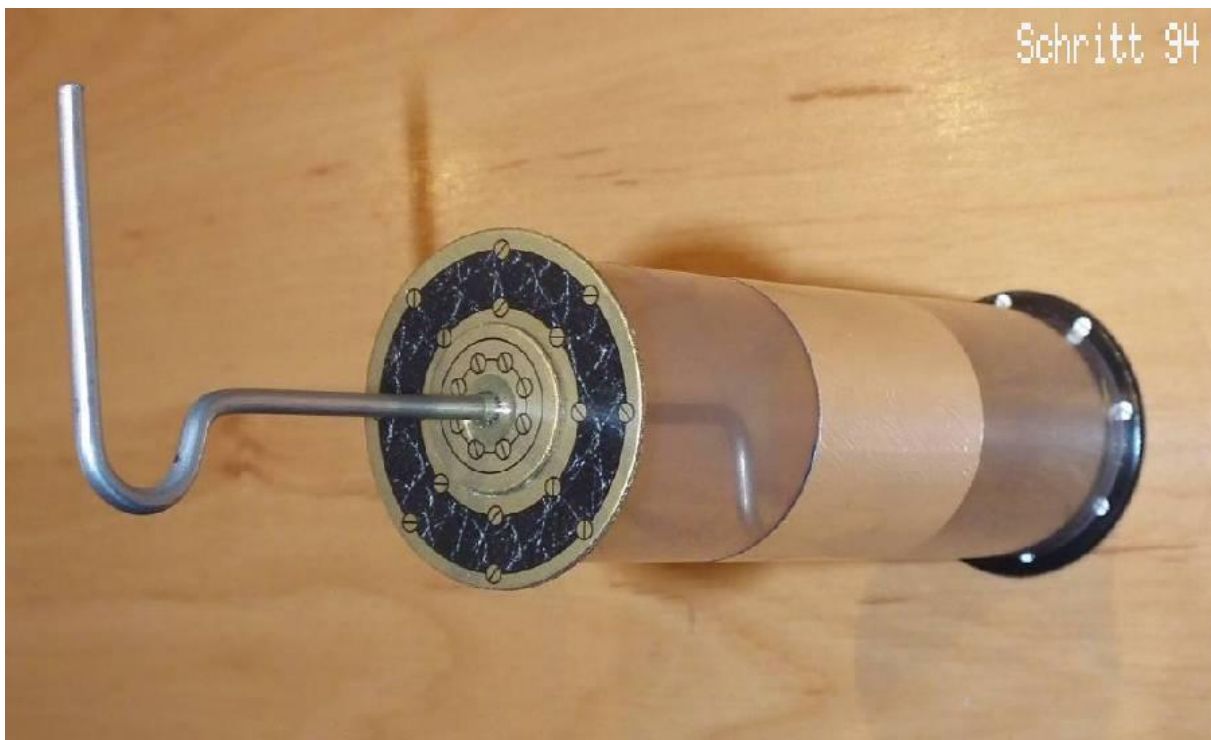
The parts shown are used in **steps 90 to 96** to create one of the Leiden bottles.



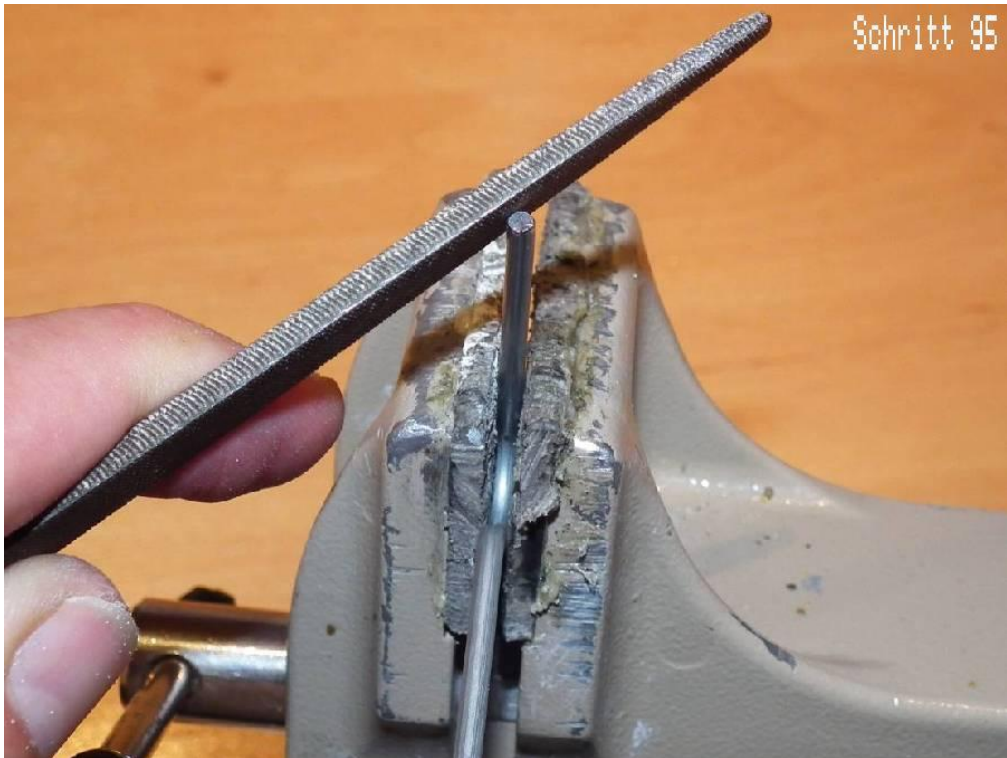
Optionally, the edges of the lid and base parts can be coloured in gold and black to match.



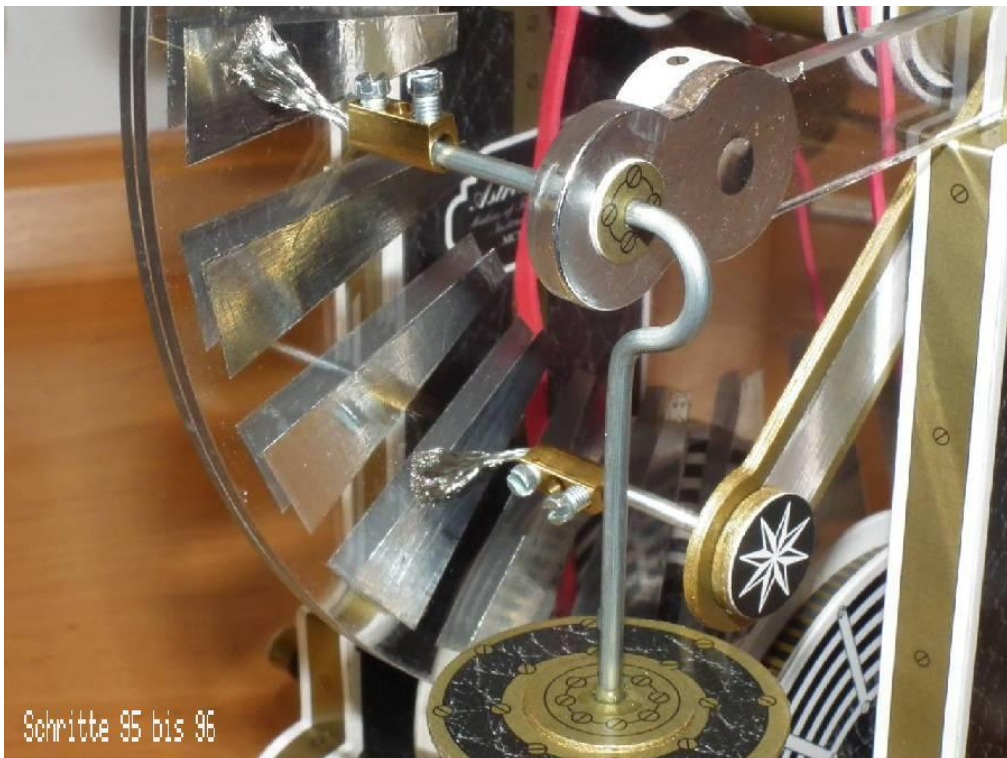
Since the two Leiden bottles are built identically, it makes sense to build these elements at the same time. The picture shows the state after completion of the work according to **steps 92 and 93 (and analogously 99 and 100)**.



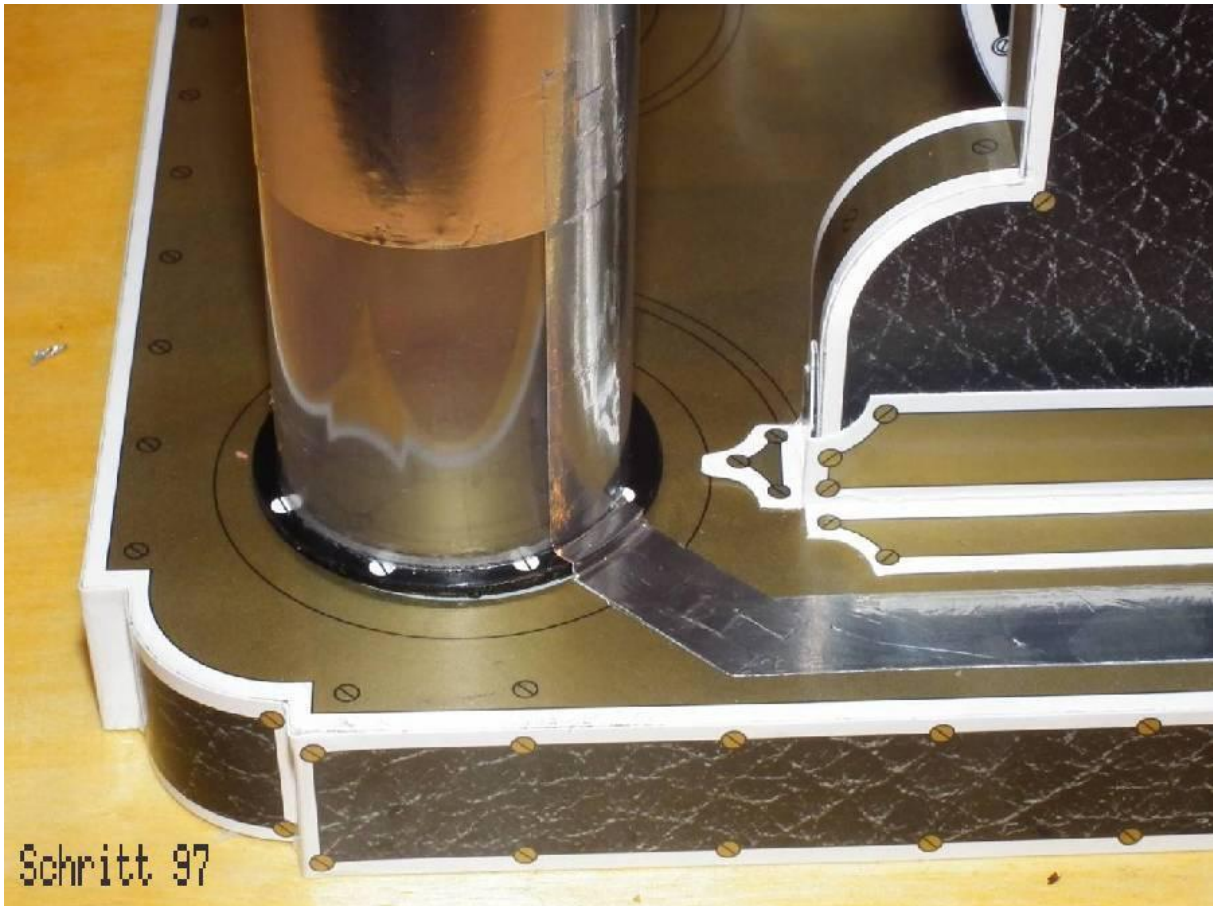
A Leiden bottle completed according to **step 94**. The electrode was fixed in the lid with a clear 2-component adhesive (UHU Plus schnellfest) and the base plate was glued to the PVC tube with a plastic adhesive (Ruderer L530).



In **step 95** (or 101) the electrode is passed through the crossbar. If this does not work smoothly due to the nature of the end of the electrode, the end of the electrode must be filed to fit.



Steps 95 & 96: The result after step 96 - the electrode of a Leiden bottle was passed through the crossbar and fixed there, the contact brush rests against the lamella disc.



The conductor bridge between the Leiden bottle and the conductor track on the base was attached according to **step 97**.

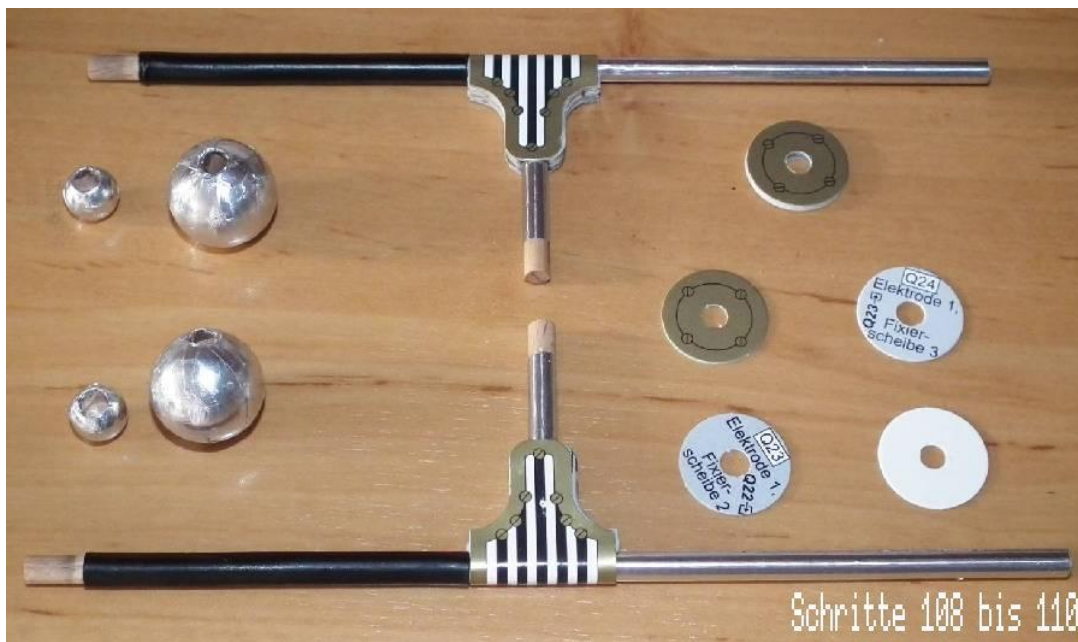
Parts Q & R - The spherical electrodes



Step 103: The picture shows how to attach the aluminium foil to the 180mm long round bar - start with the long side parallel to the longitudinal axis of the bar.



Steps 104 – 107: State of the individual parts of an electrode rod after step 107.



What the instructions for **steps 108 to 110** lead to: Electrode balls covered with aluminium foil and electrode rods with axes.

On the left in the picture a preview of steps 111 and 113, on the right in the picture the 4-part fixing discs to be created in step 114.



Steps 111 & 113: The sticking of the balls should be as smooth as possible and should not have any free surfaces. Furthermore, the film must protrude into the holes. For the spheres with a blind hole, place the centre of the film on the side opposite the hole and stick towards the hole. For the other spheres, place the film centrally on the "equator" of the sphere (holes then correspond to the north and south poles) and stick first around the sphere, then towards each of the holes.



Step 114 also describes how to mount the ball electrodes on the crossbar. You can see the result in the second picture of the next section...

Part 5 - The launch



After attaching the electrode rods, the machine is ready for operation.



A well thought-out mix of mechanics and electrics as well as an aesthetic design give the "Blitzgerät" a very special charm.



A beautiful back can also be charming...