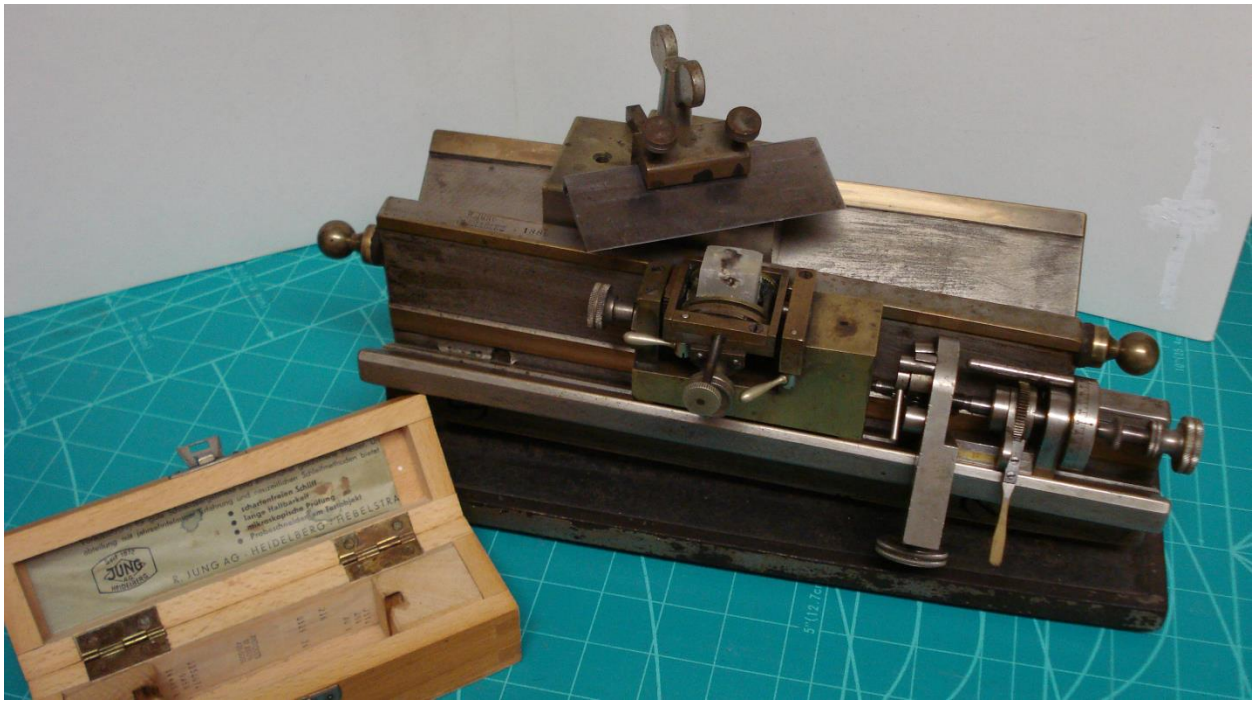
Serendipity - an old Microtome



In 1971, while browsing through an antique shop in a mall, I stumbled across an old instrument hidden under a shelf in a corner: It was a Jung sliding microtome in bits and pieces, but apparently complete. For one reason or another I did not pursue the matter, but as the company I worked for did represent Jung in Canada, I wrote to the company and asked if they might be interested in acquiring this instrument for their museum/collection. They replied that they had just recently obtained a large number of instruments from the University of Heidelberg and, no, they had such a model already.

Another year had passed when this microtome somehow rose in my memory again. I wondered if it was still lying in the dusty plastic bags in that antique shop. I went there, and - surprise, surprise - I could not believe my luck, it still lay there exactly as I had seen it a full year earlier. I talked to the store's owner and indicated my interest. Immediately he embarked on a long lecture how particularly doctors are keen to have such an instrument as decoration on their mantelpiece or in their office etc. etc. I let him talk, shoot his guns, and then asked quietly how come it is lying there under a shelf, dusty and untouched, for over a year?

That took the wind out of his sails. I named a low price, he wanted more and we eventually agreed on a median price. I paid and proudly carried my rather heavy prize home. Subsequent correspondence with Jung revealed that the instrument was made in 1892 and sold to a Scientific/Medical Instruments Supply Company in Bonn in August 1892 under order #4447, all that information by return of mail after two world wars and a move of the company, lock, stock, and barrel, to a new location! According to the antique dealer it came from a doctor's estate in Prince Edward Island. Together with 2 small handmicrotomes, one Tasco and one Meopta, it is now part of my collection.

A Sliding Microtome after Thoma.

Prior to the appearance ot the Thoma microtome there was much development in the field of Microtechnique at the beginning of the 19th century and the Thoma microtome was not the first using the inclined slideway for precise incremental sectioning. A full history can be found in Brian Bracegirdle's book "A History of Microtechnique" (ISBN 0-940095-09-2).

Thoma's main improvement was to change from simple slide bearings to individual ivory bearings on the moving blocks thus eliminating uneven wear and guarantee stable positioning.

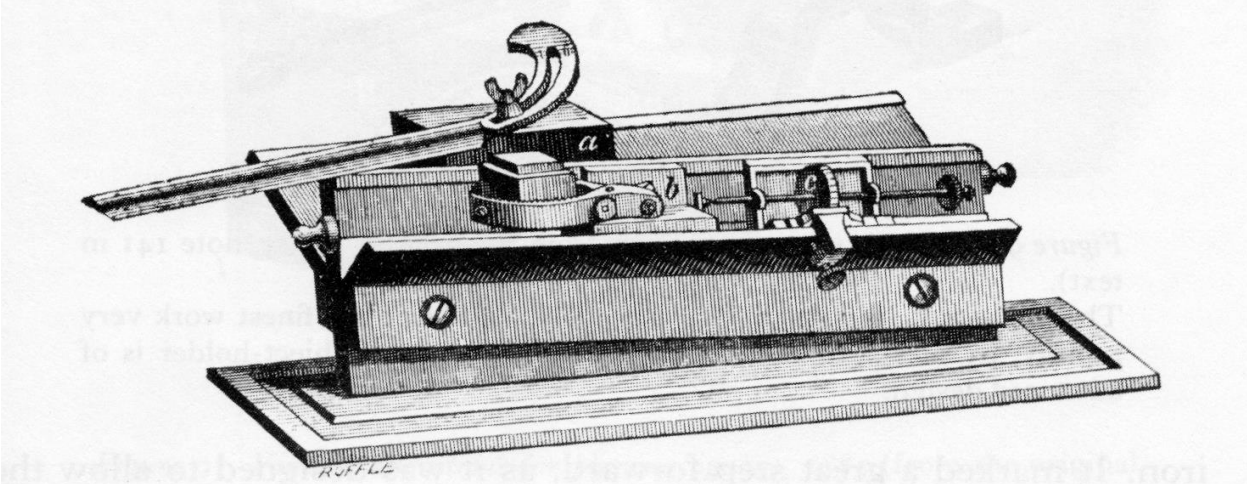


Figure 95. Thoma's microtome, 1881 (from the original paper, note 139 in text).
The important innovation in this model was that the carriers slid, not with all their surfaces in contact with the grooves, but with only five points of contact. This is the minimum number needed to maintain position, and this precision removed a major source of inaccuracy in the inclined-plane instrument. In later models the points would be made of ivory or even agate, obviating need for lubrication of the ways.

(lllustration and text from B. Bracegirdle)

This early Thoma microtome has simple knife and object holders, but the feed mechanism shows already the main features of his later models.

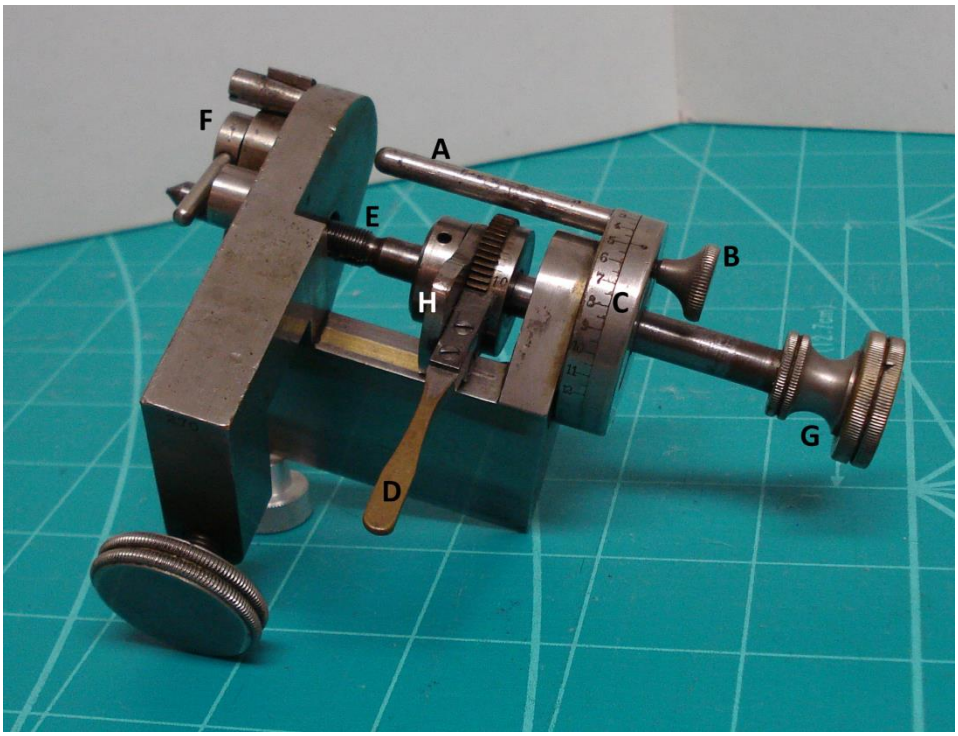
My microtome, shown in the next illustration, is engraved "R. Jung Heidelberg 1886". It is of the sliding type, where the object moves on an inclined guideway while the knive slides over it on a horizontal guideway.

All guideways are brass. A micrometer screw, acting against an agate insert, pushes the specimen upwards in microscopic increments, selectable by an ingenious mechanism. The speciment itself is clamped in a small movable gimballed vice and can be oriented in 2 axes. The knife is held in a sliding block. Two almost decorative balls on either end allow the heavy instrument to be manœuvered and lifted, while the cast-iron base plate has a raised edge to retain any dripped liquid or wax particles. Most parts are nickel plated, others are blank brass, either original or due to heavy use. All moving parts glide on small pieces of ivory, of which one

or two are slightly damaged, but still functional. All in all, I'd say the instrument is still fully functioning.

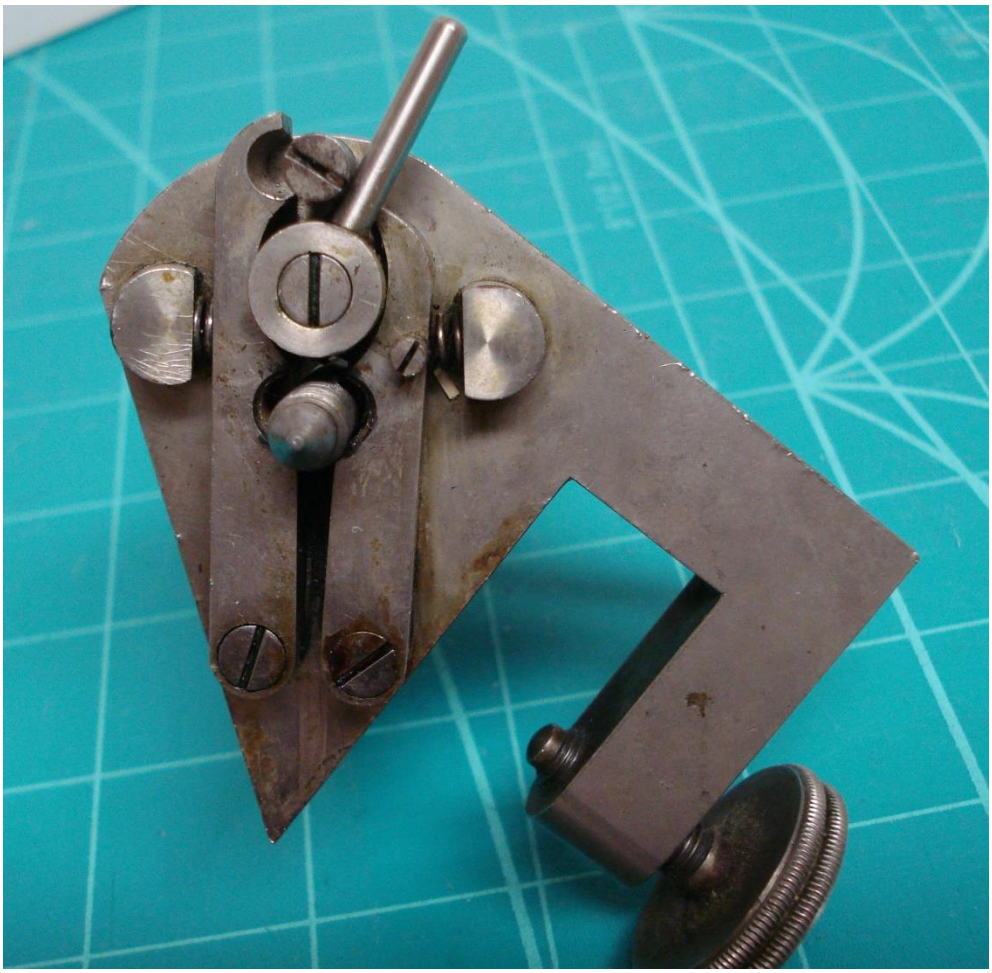
A Detailed Description

The adjustable knife holder **A** with knife **F** slides on the horizontal guideways **E** by means of a vertical handle.
The specimen in its paraffinblock **G** sits mounted in its vice on block **B** which is being pushed up the inclined guideway **D** by the micrometer screw on the feed mechanism **C.** The two balls left and right for handling are clearly visible. The instrument's base is made of cast iron.



The Feed Mechanism

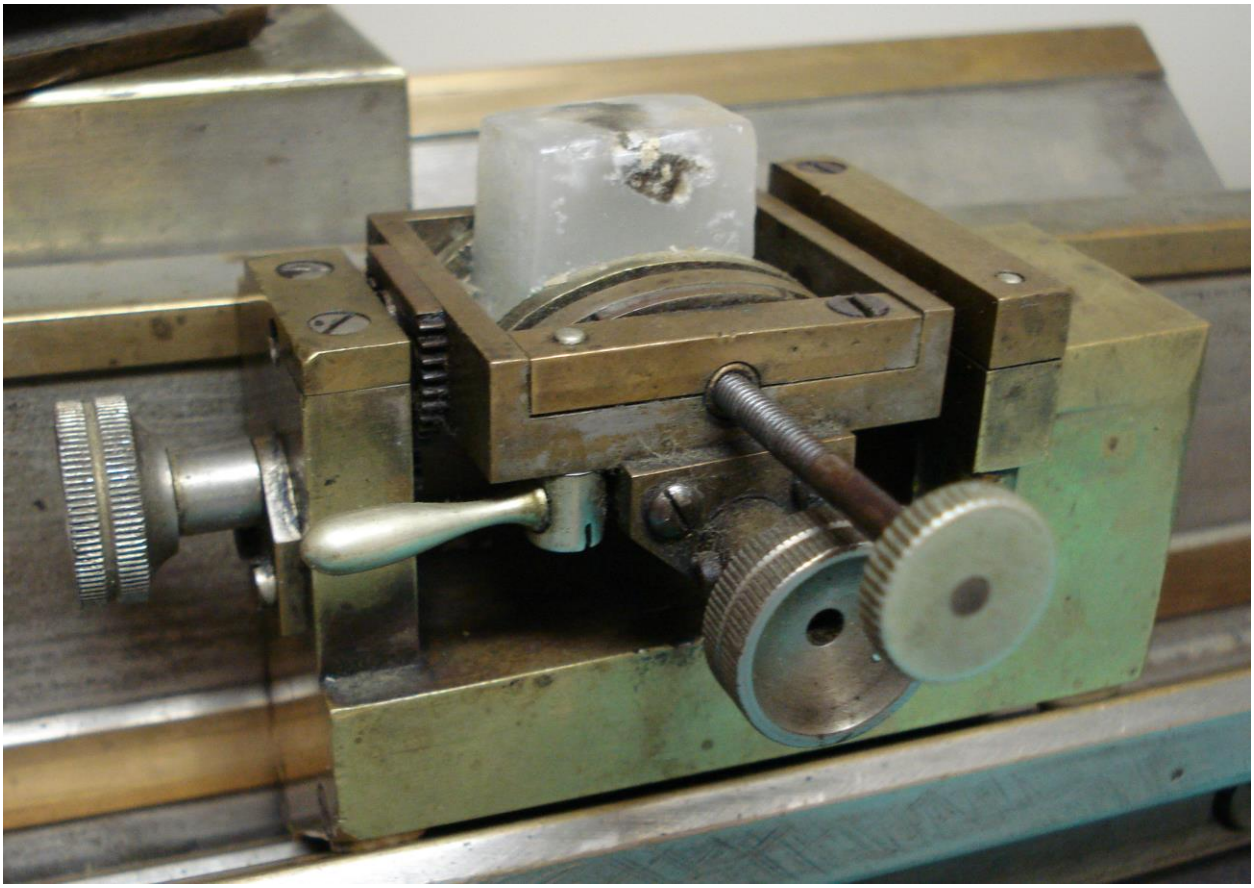
The next illustration shows the feed mechanism. **E** is the feed spindle with a pitch of 0.6mm. It can be withdrawn quickly by the knob **G** after releasing the clutch **F**. After selecting the desired section thickness on the scale **C** and locking it with the knob **B,** the ratchet lever **D** is pushed up till the cam **H** stops at **A.** This moves the spindle forward exactly for the pre-selected section thickness. The spindle **E** can be unlocked by releasing the clutch **F** and withdrawn quickly by pulling the knob **G.** The scale **C** is graduated in 0.001 mm (1µ), subdivided in 0.0005mm (0.5µ), the maximum thickness that can be set is 0.03mm (30µ). Maximum feed range is 15mm.

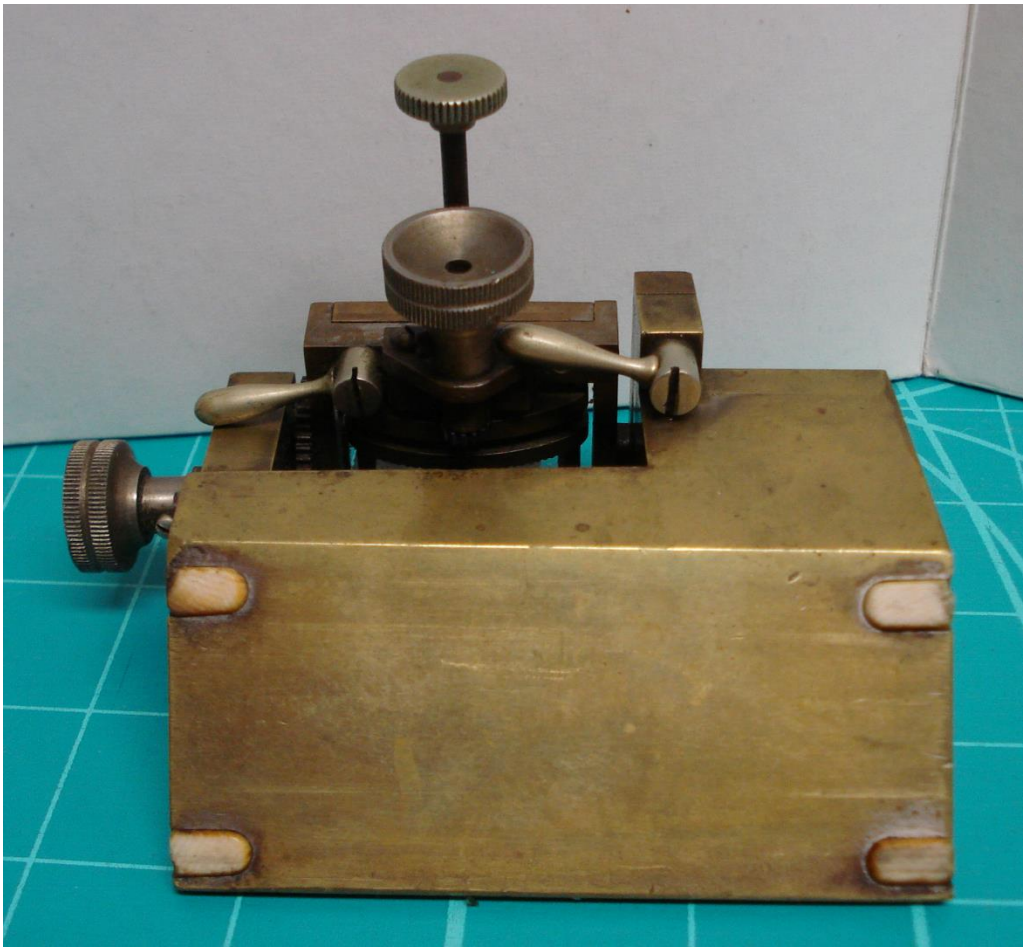


The clutch mechanism shown in open position

The Object Block

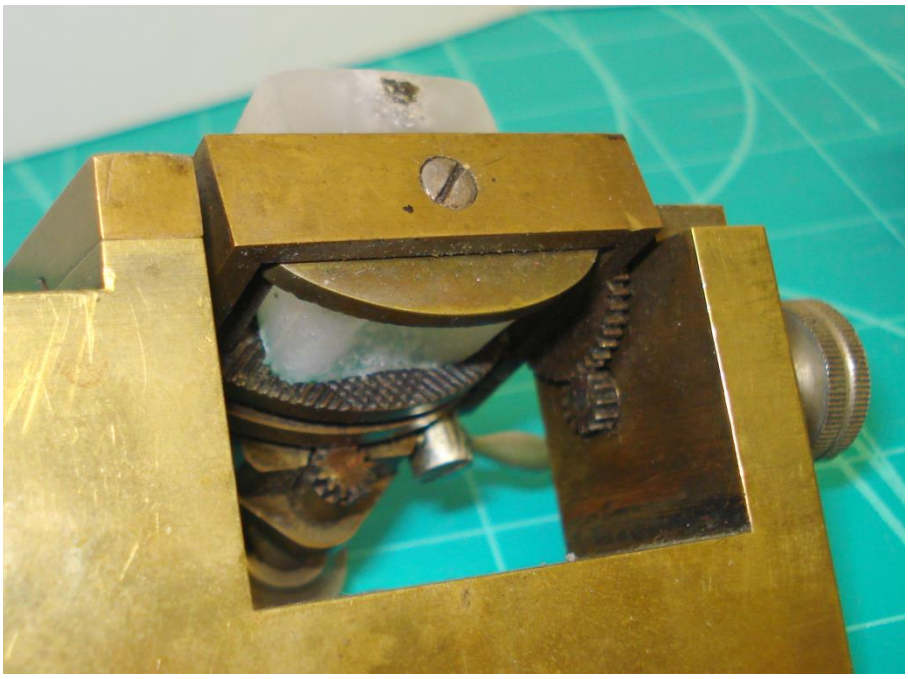
The object block shows in detail its various movements. The large knob in front activates the E-W tilt which can be secured with the clamping lever on the left. The large knob on the left moves the speciment in the N-S tilt, the respective clamping lever on the right is obscured. The small knob in front is for the vice which accepts objects of max. 37 - 40mm. The microtome is particularly recommended for paraffin-embedded specimens (one such specimen is shown).





Here you see the 4 embedded ivory bearings on the underside of the object block, two more are located on the backside. Also visible are the two clubshaped lamping levers for the gimballed vice. The ivory bearings are inserted in miniature dovetails and secured against movement (slipping
out) with a screw.

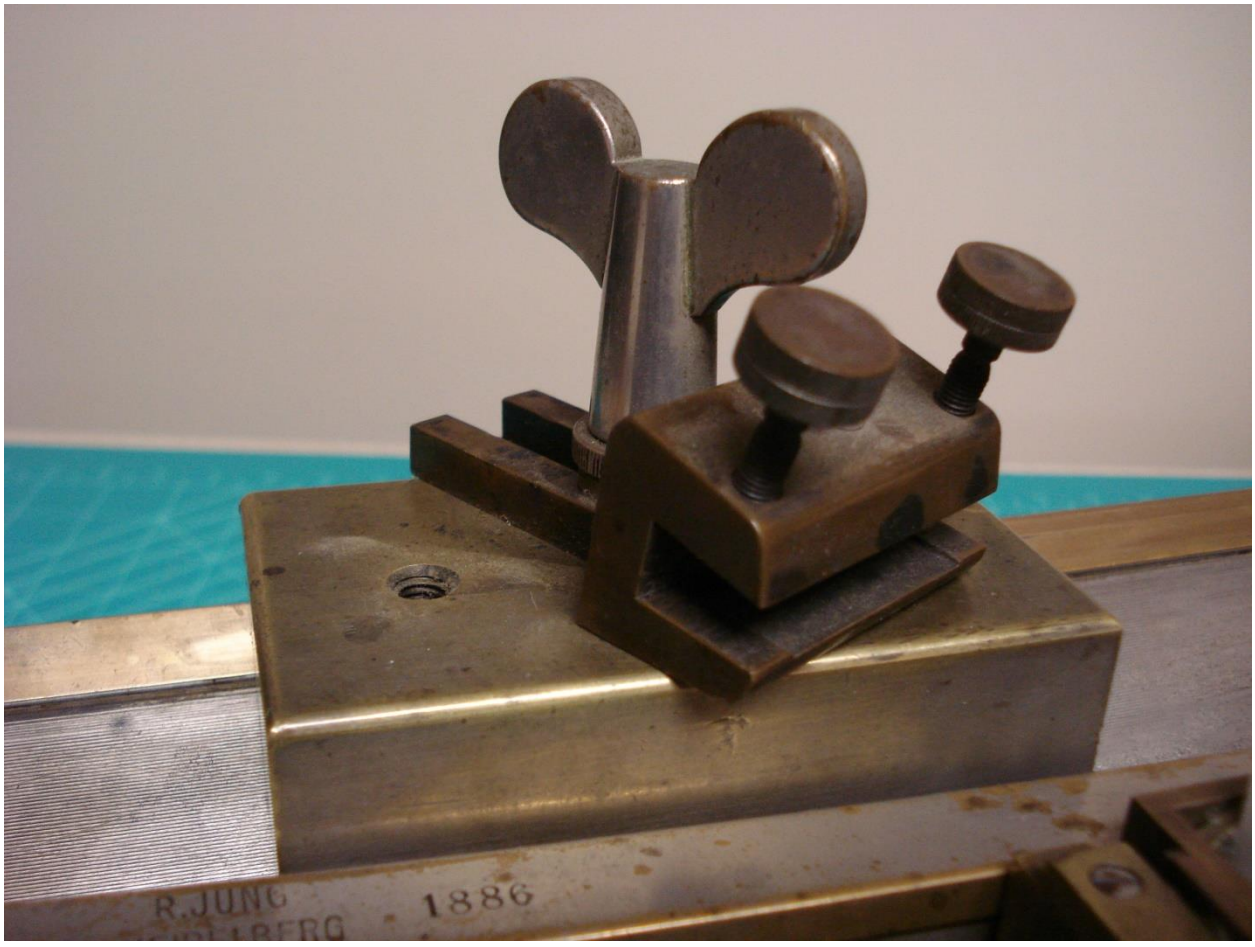
At right: a closeup ot the gear mechanism of the vice gimbal.



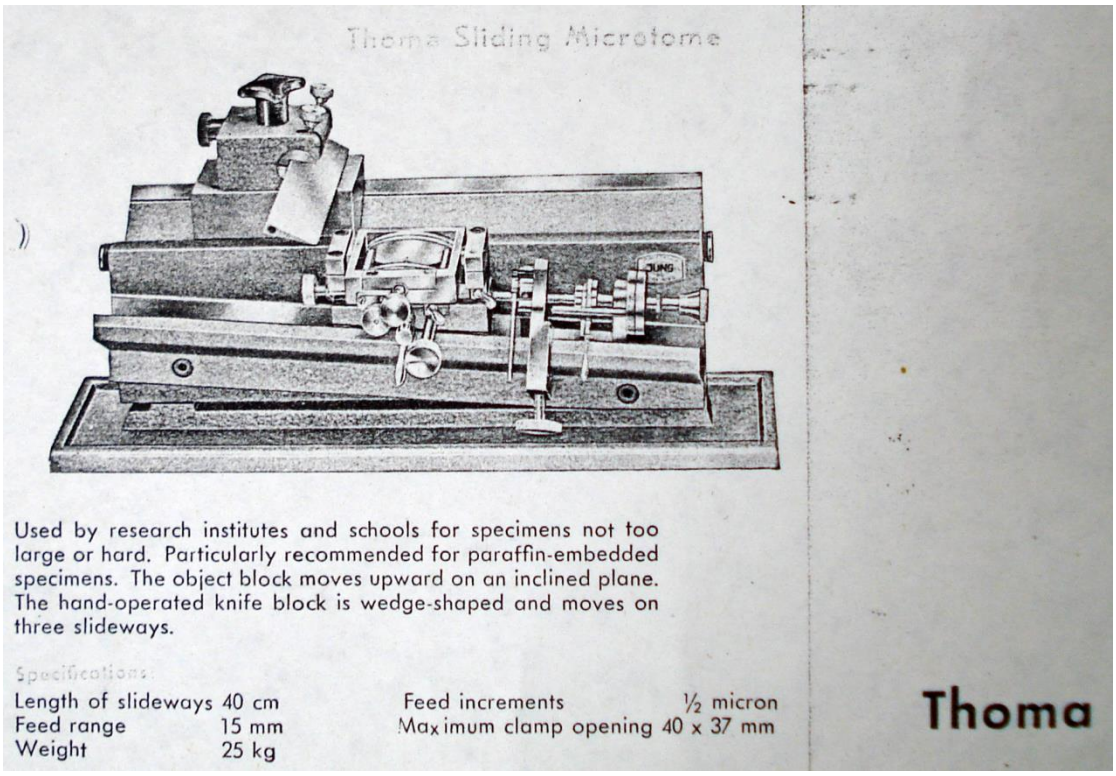
A in this illustration shows the agate plate in the object block against which the feed spindle pushes. In this case it is slightly damaged, probably due to some careless knocking against the spindle. Clearly visible is also the mounting of the ivory bearings and their securing screws.

The Knife Holder

The knife holder is a simple affair. There are three thread locations for the large locking screw. The receptacle for the knife is undercut to provide secure positioning. A relatively long slotted arm allows for a wide range of knife positions .My knife is the recommended 100mm long. I understand that there is a variety of knife profiles available, depending on the hardness of the specimens.

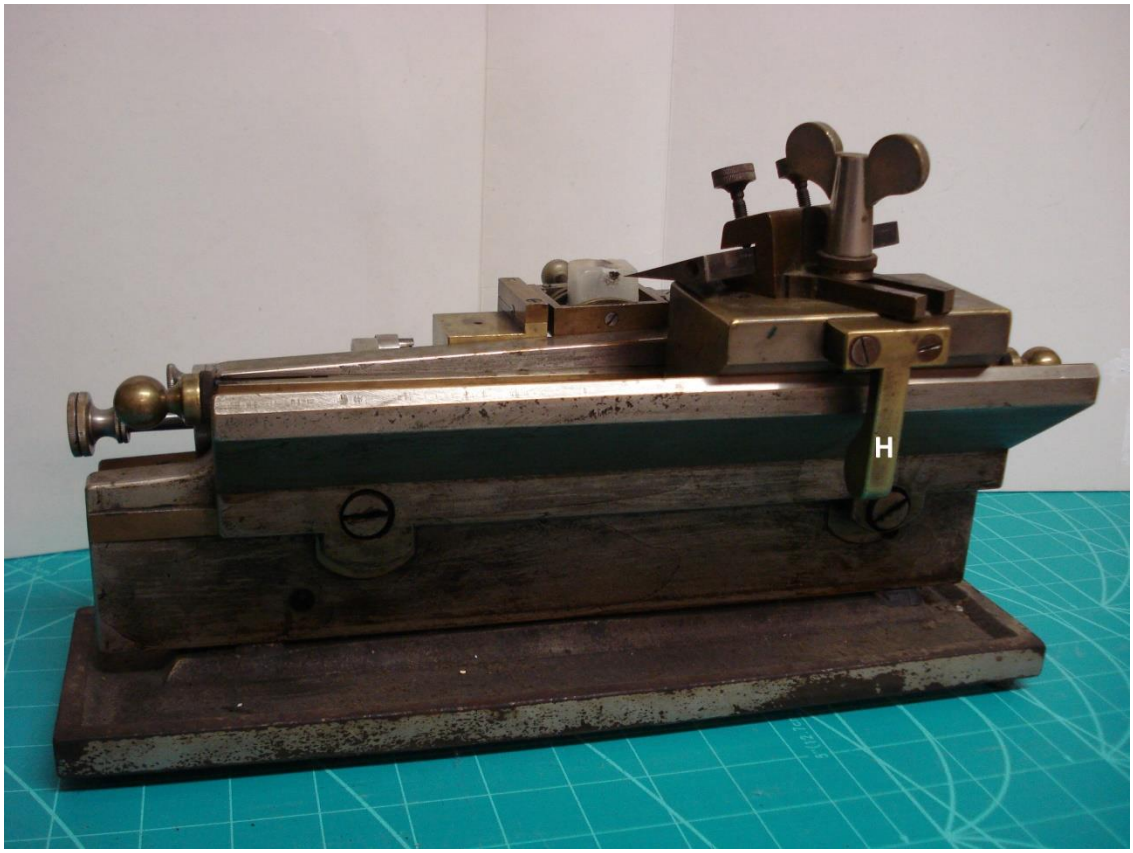


The following illustration is from a catalogue of R. Jung AG Heidelberg. It shows a more recent model of a Thoma microtome. You may notice some obvious changes: the knife holder has been modernized with a new clamping device for changing the cutting angle and a modern locking knob, furthermore the company's logo appears now in the form of a small plaque. In my model it is engraved as shown below. Some other minor improvements are apparent on the feed mechanism, but all its major features have not been changed.



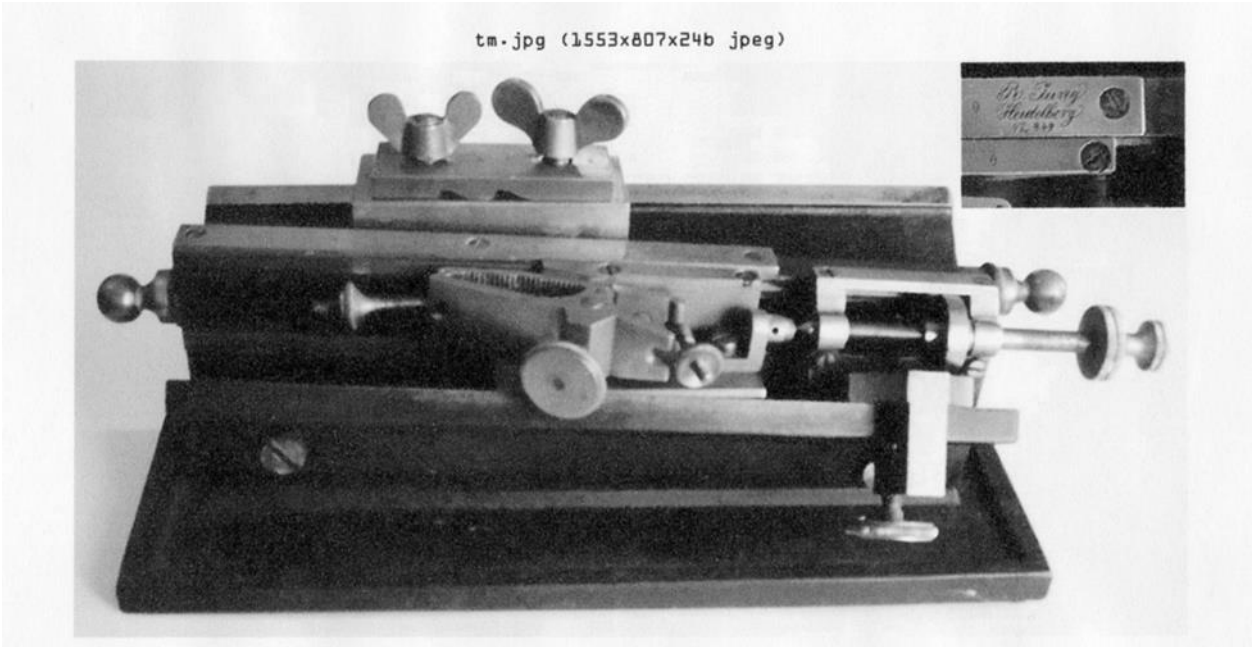
Above: The engraving of the manufacturers name on my microtome

Right: The Jung nameplate on my microtome knife box, probably early 20th century.

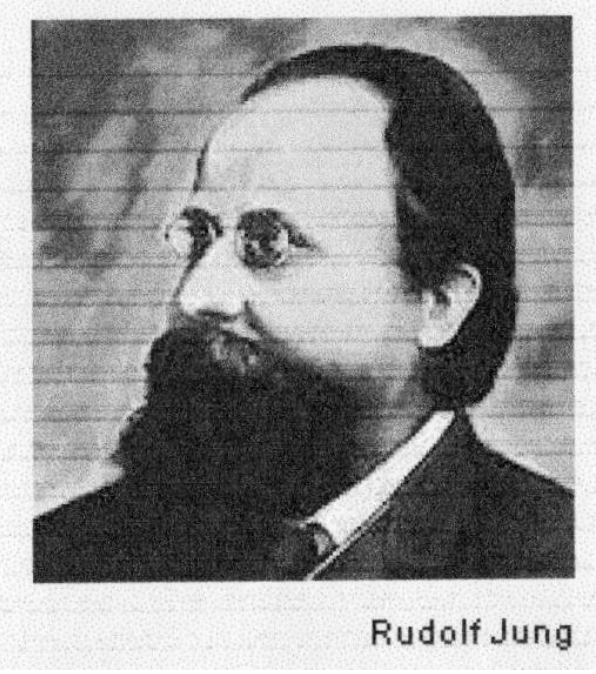


A view of the rear side showing the small vertical lever **H** for sliding the knife block.

This Jung microtome after Thoma is not light affair: it puts 25kg on the scale, so the two balls are not just decorative but come in handy when it is a question of moving it around.



The last illustration is from my files. It is marked "Ed. Markham's Collection". It shows an older Thoma microtome with a serial number 849 and signed "R. Jung, Heidelberg" in a rather elaborate script. There are considerable differences , for example in the knife holder (for razors?), in the object block, and in the feed mechanism. In the latter a scaled wheel turns with the spindle along the bar on top which acts as index for the advance. But the essential features are all there (except, the ivory bearings are, of course, not visible).



Rudolf Jung

Rudolf Jung founded his business in 1872 in the university town of Heidelberg, Germany. The existence of a world-renowned university most certainly proved to be a fertile ground for the establishment of a precision instrument workshop. In 1975 Jung joined Reichert, an Austrian microscope and microtome manufacturer. Their products sold under the Reichert-Jung name.
In 1986 Reichert-Jung in turn was taken over by Cambridge Instruments, a British company that had absorbed Leitz and markets its products now under the name of ***Leica***. Today the names of Jung, Reichert, and Leitz have, sadly, disappeared.

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