The Vickers Patholux Microscope

A brief description and comparison with its related smaller models

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This instrument was produced by Vickers Instruments Ltd, in the UK, shortly after their subsidiary Cooke, Troughton and Simms (CTS) was merged with C. Baker Instruments Ltd., in 1959. At this point, their microscopes started to be marketed under the Vickers name.

The Patholux (M32) was a Baker designed research stand of fairly radical design, with much thought dedicated to the ergonomics, and a very simple patented focusing system. It appears to have been sold from about 1962 to about 1972 (1,2).

Two smaller, laboratory stands were also produced: the Patholette (M16) and Metalette (M29).

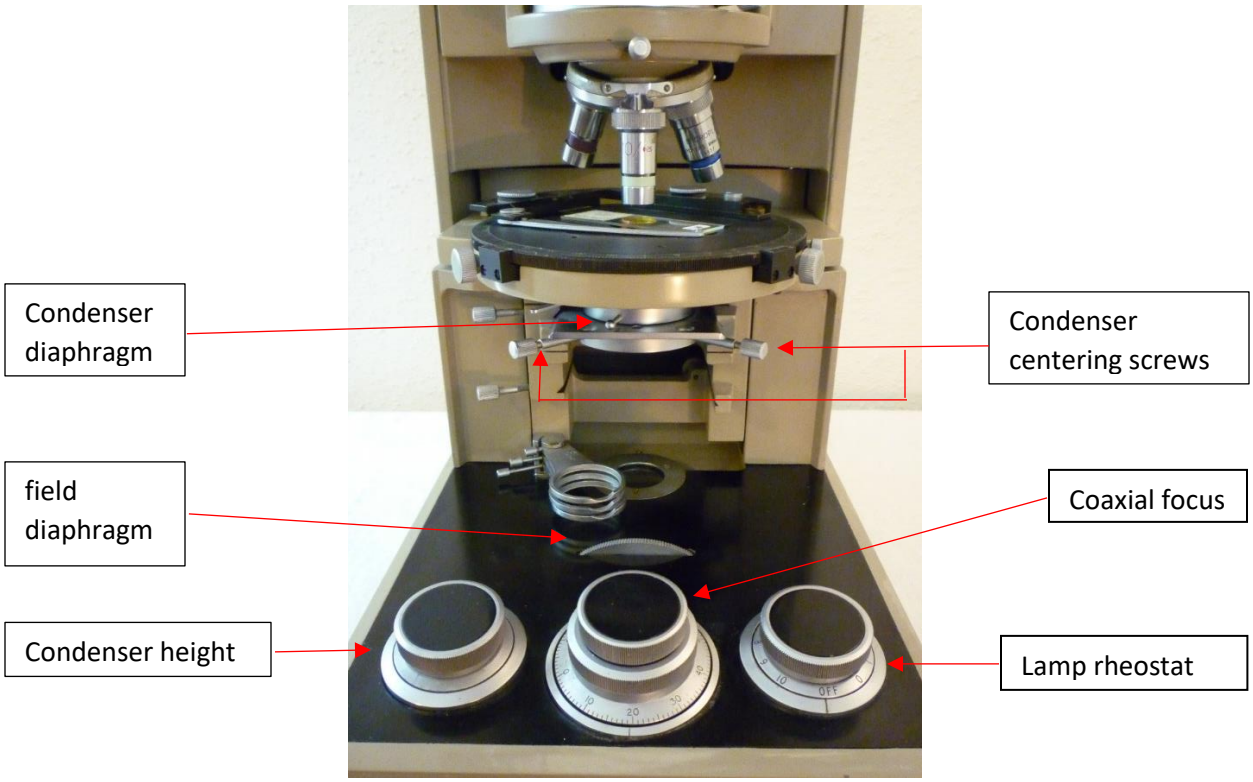
The former has already been described in a very nice Micscape article by Paul James (3), so I will mostly just use it for comparison, but will briefly describe the latter, which is an inverted metallurgical microscope, and also provide a family portrait of the three siblings together.

General Design

The stand is massive, 25Kg (55Lb), and L-shaped, 18in tall (110cm), and contains the lamp transformer.
The rather compact illuminator contains a 100W halogen bulb.
The stage is fixed and there is a sliding, focusing carrier for the head. The movement of this is on ball bearings rather than the usual dovetail slides, allowing it to be wider and thus very stable.
This particular example has a rotating petrographic stage, since it was originally set up for interference contrast (Smith system).
There are two slots under the stage to take a condenser and, if needed, a polarizer, both on Akehurst slides, and under this there are three flip-out filter carriers.
Controls for the condenser height, focus and rheostat are grouped at the front of the stand, and the field diaphragm is between these and the substage illumination.

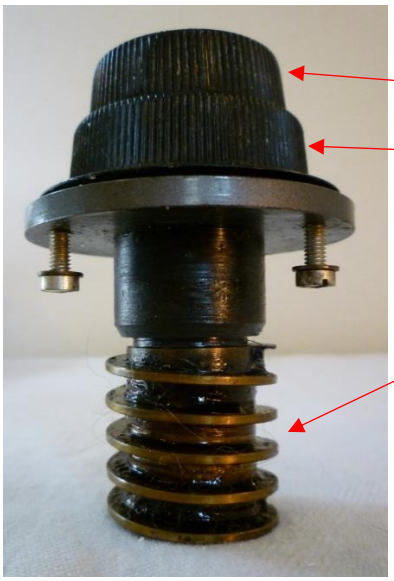
As in many research models, there is provision for extra height setting for the head in order to accommodate large specimens.

Controls



Focusing System

The focusing system is coaxial. The coarse focus uses a helical cam and lever (lever and scroll), and the fine adjustment is by fine screw and lever.



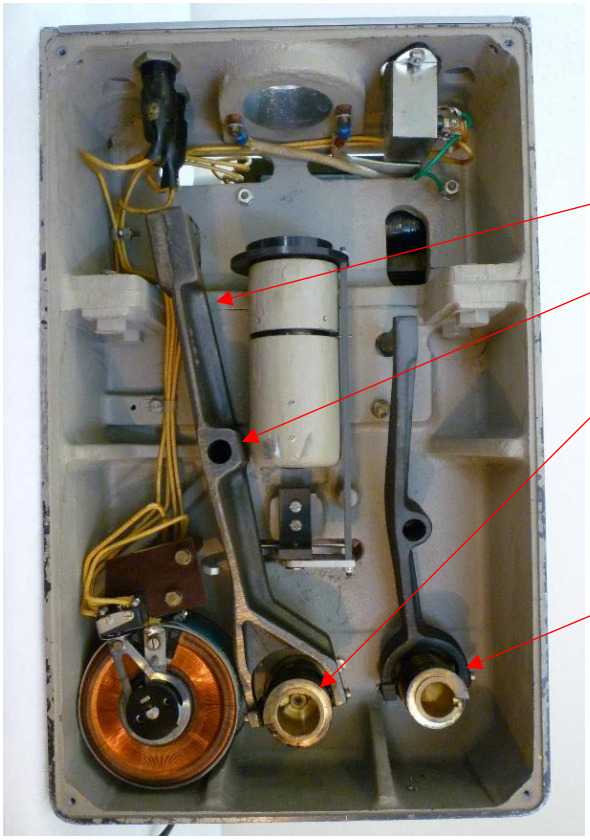
Focus unit (from a Patholette)

Coarse focus knob

Fine focus knob

Helical cam

Turning the coarse focus knob rotates the cam, whereas turning the fine focus moves the cam up or down.



View with baseplate removed

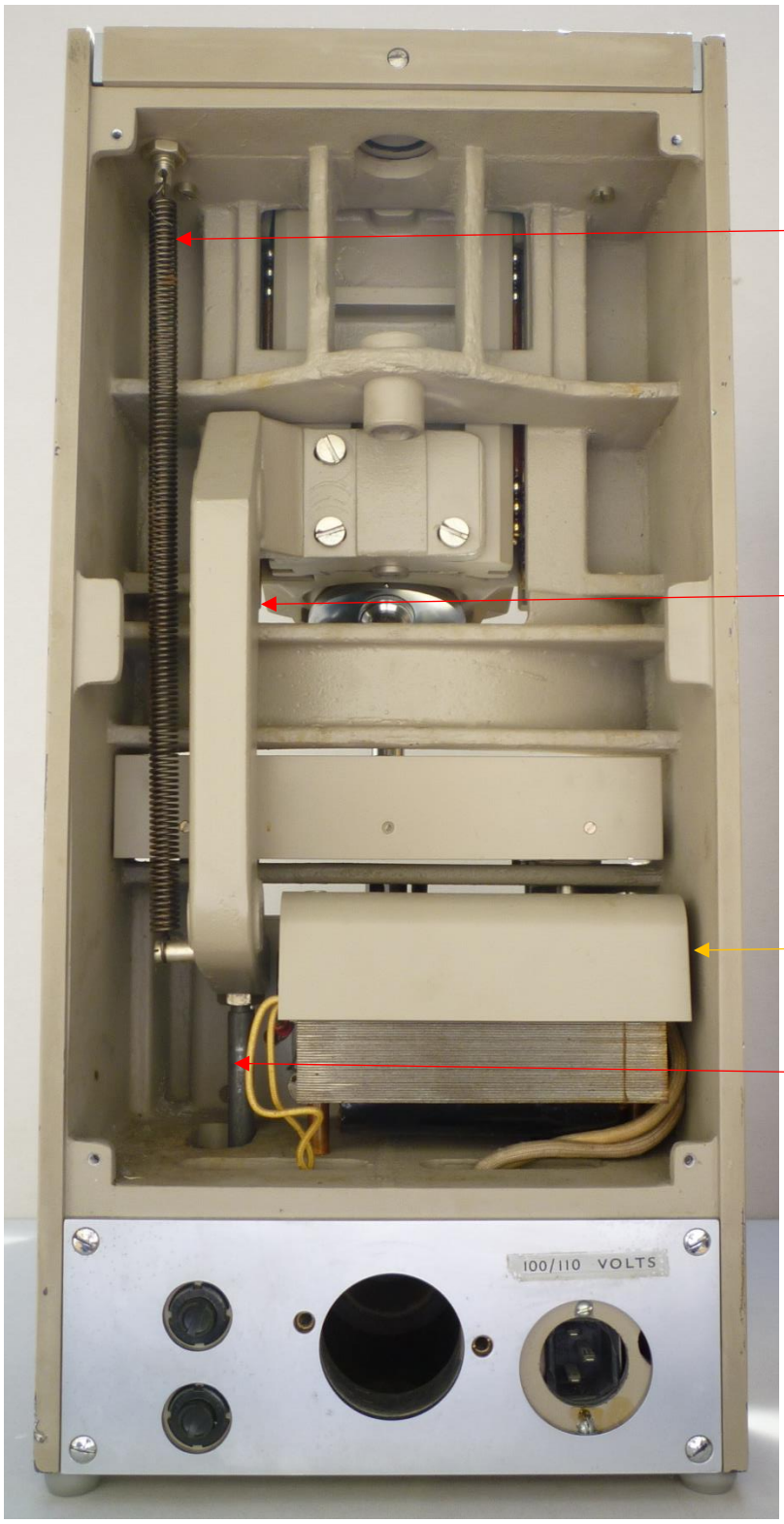
Cam follower

Pivot

Helical cam

The condenser unit is also moved by a similar, slightly smaller cam.

In the bottom left corner is the rheostat.



View with rear cover plate removed

Tensioning spring to counteract weight of head.

Arm of head support

Transformer 110v to 12v

Rod transferring motion from cam-follower to arm of head support

Illumination

The illuminator unit uses a 12 volt, 100W halogen bulb. There are two centering screws for the bulb and focus control for the lens. The transformer is in the upright part of the microscope stand, and when the illuminator is inserted into the stand, two pins connect it to the supply.

Optics

The condenser height is controlled by a similar cam system to the focus and is contained in the base of the microscope. This example came with an achromatic 1.3NA condenser with flip-out top lens. However, the Trilux condenser was also available, which provided bright-field, dark-field or phase-contrast, along the lines of the Leitz Heine.

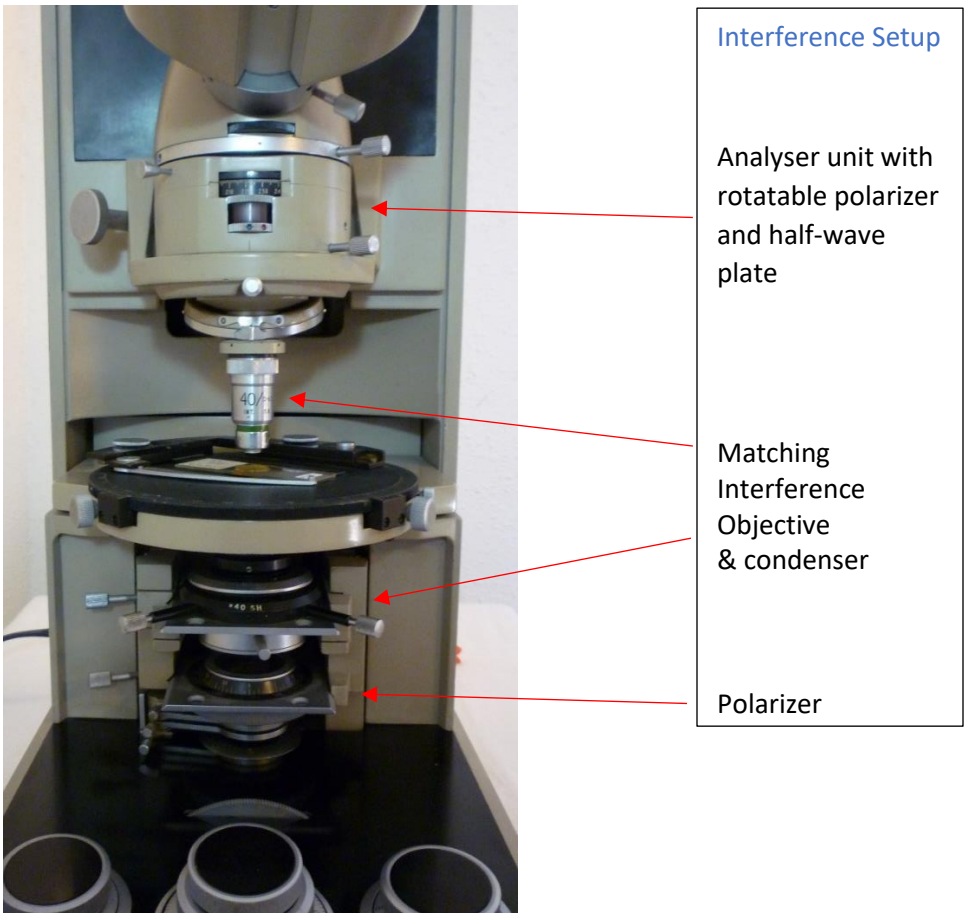
The objectives designed for these stands are of 44mm parfocal length, and were the successors to the 34mm body-length, and predate the later 45mm DIN standard. They come as achromatic, Microplan, fluorite and apochromatic, and have the very characteristic sliding barrel of this era in Vickers design. Previous generations of objectives had not needed this feature since the fine focus moved the objective changer only and thus bore little weight.

Condenser with flip-out top lens

Microplan Objectives

Interference Equipment

This example came equipped for the (Smith system of) interference microscopy. This actually allows for two slightly different techniques to be applied: Shearing System (SH) and Double Focus (DF), and is rather different to the more commonly used Nomarski Interference Contrast method. A brief description of this technique is given in (4).
So, polarizing and analyzing units can be put in the illumination train. Dedicated matching objectives and condensers, both containing double-refracting plates, complete the kit.
With this setup, the instrument was designated the Interlux (2)



Matched condenser and objective (40x SH)

Patholette & Metalette

The examples are actually marked C. BAKER, LONDON. In the early years of the amalgamation of the two firms, production continued at both factories in York (CTS) and London (Baker), and products could be labelled with the names Baker, CTS, Vickers or combinations.
The high-intensity illuminator is a neat design, with a holder for the lamp unit when not in use.
In the case of the Patholette, the focus mechanism moves the stage. For the Metalette, since the positions of the stage and head are inverted, it is the latter which moves.
Careful comparison of this Patholette with the Vickers version shown in the article by Paul James (3) will show slight differences. For example, in the drop-down stage controls.
Both instruments would originally have been supplied with a neatly designed, hinged, plastic dome-shaped carrying case, containing holders for lenses etc., which wrapped around the instrument. Few of these seem to have survived though.
The Metalette is equipped with a gliding stage, which is a delight to use, and there was a choice of standard stage clips or a special specimen holder for small objects, as shown here. The objectives were of course corrected for no coverslip (met) and came in all the standard versions.
The chief selling points for the two instruments, judging by the sales brochures, appear to have been ergonomic design of the controls and rigidity of the stand.

Closeup of metalette

Gliding stage. This rests on the stage bracket and glides, under manual control, on a film of grease.

Condenser with iris diaphragm, operated by rotating the unit.

Metalette stage and holder

Specimen is placed face downwards on the stage, off center. Holder is rotated over it, lowered, and a piece of plasticine (Play-Doh) pressed through the holder to fix it in place.

Metalette with lamp unit

The lamp unit has a pre-focused 6v, 15watt bulb, and there is an iris diaphragm. The same arrangement works for the Patholette also. Unfortunately, after 50 years, factory pre-focused illumination is rarely still so!

Summary

Side by side comparison of all three instruments.

Production of the Patholux ceased in about 1972 in favor of the M41 Photoplan.
The main reason for its demise was the difficulty in adapting it to incident illumination (1,2). I would suggest also the difficulty in setting up photography with this design was also a contributing factor.
It is slightly curious that Baker designed this microscope with a focusing head rather than stage when the other manufacturers were following the lead set by Leitz with the fully modular, fixed head and focusing stage Ortholux. The CTS research stand, the M4000, followed this principle (at least for the coarse focus), and the existence of the Patholette shows that the unique focusing mechanism was not a problem in this regard. However, a fixed stage has advantages for some applications, such as micromanipulation operations, and the Patholux design continued in some specialized applications for several years (2).
In operation, the Patholux is very satisfying to use. The unit is very stable, the focus very smooth, and the controls nicely situated, except for the condenser iris lever which is rather small. Equipped with the standard square stage with drop-down coaxial controls, I imagine it would be even better. Unfortunately, the interference unit needs some repair and so I have not been able to test that yet.
I have not had much need to use metallurgical microscopes and so am unable to comment with any great authority on the Metalette. A useful comparison might be with the very popular Unitron models, of which I have a BMEC, and recently spent quite a lot of time restoring. It seems a cramped and awkward instrument to use, and the Metalette would probably come out better in terms of ease of use, especially considering its wonderful glide stage.

References

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