A Mid-Nineteen-Forties Spencer Microscope

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Over the years I have developed an affection for early to mid-twentieth century AO Spencer and Bausch & Lomb microscopes. They are sturdy; made of iron, steel, brass, bronze, chrome, a bit of aluminum, and if there is any plastic at all, it is usually Bakelite. Plus, for collectors, they can be had cheaply.
My most recent acquisition was found at www.shopgoodwill.com from a store in California and my winning bid was $48 USD (plus about $30 shipping).

The Spencer Lens Company

The Spencer Lens Company was founded in 1895 in Buffalo, New York, USA. The company manufactured high quality microscopes and is considered the first American microscope manufacturer. In 1935 American Optical purchased the Spencer Lens Company and in 1945 the name was changed to American Optical Scientific Division, hence the designation found on many microscopes as "AO Spencer."
If you do a Google search of "Spencer Buffalo microscopes", you find many models under that name because of the logos on the microscopes, such as this one:

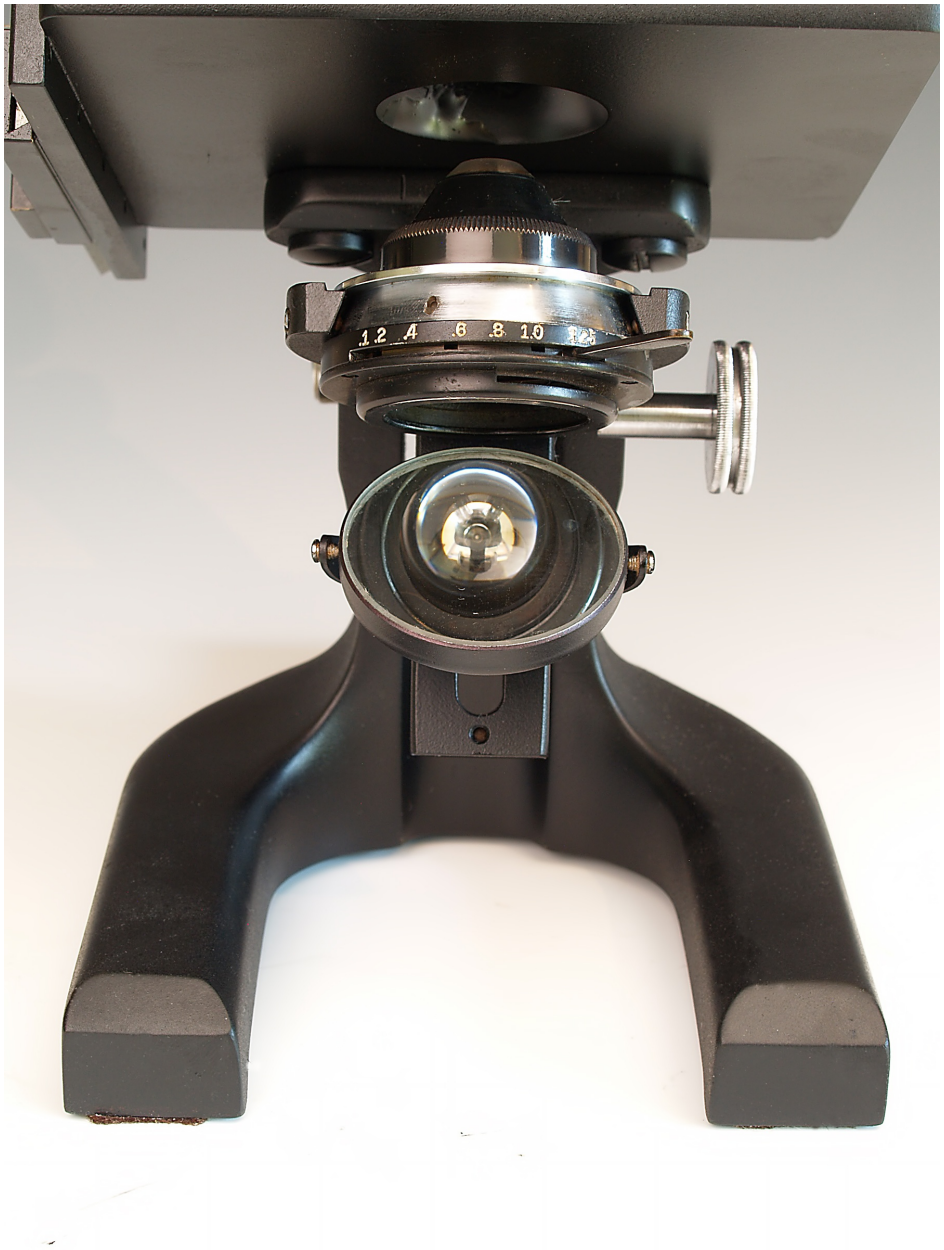
A Spencer “Buffalo” microscope is no more a model designation as an Olympus ”Tokyo” microscope. It is simply the city where the company is based.

The microscope I obtained for my collection was shipped from Spencer in about 1944. I was able to track down the date through the serial number on the very thorough website about all things Spencer microscope at http://user.xmission.com/~psneeley/Personal/Microscope.htm , a labor of love by P.S. Neely.

The scope came with the original wooden case (including the key!).

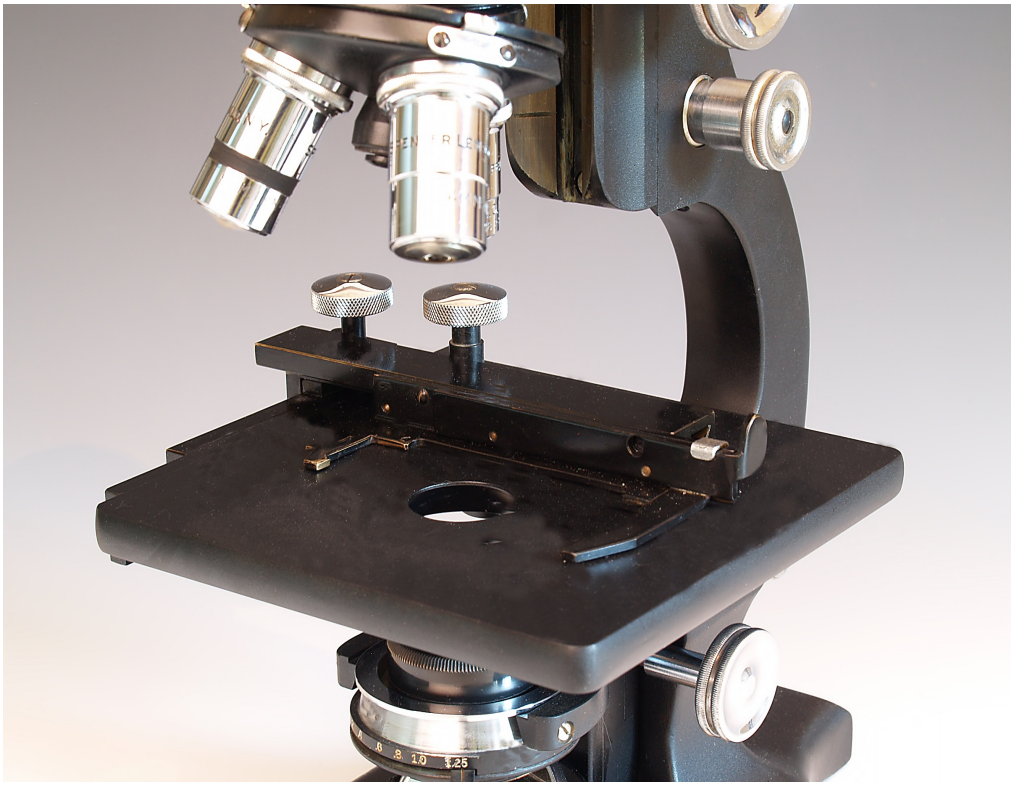
The scope needed a lot of work since most of the controls were stiff or frozen through years of disuse. At the end of this article I will describe some of my practices for restoring antique microscopes.

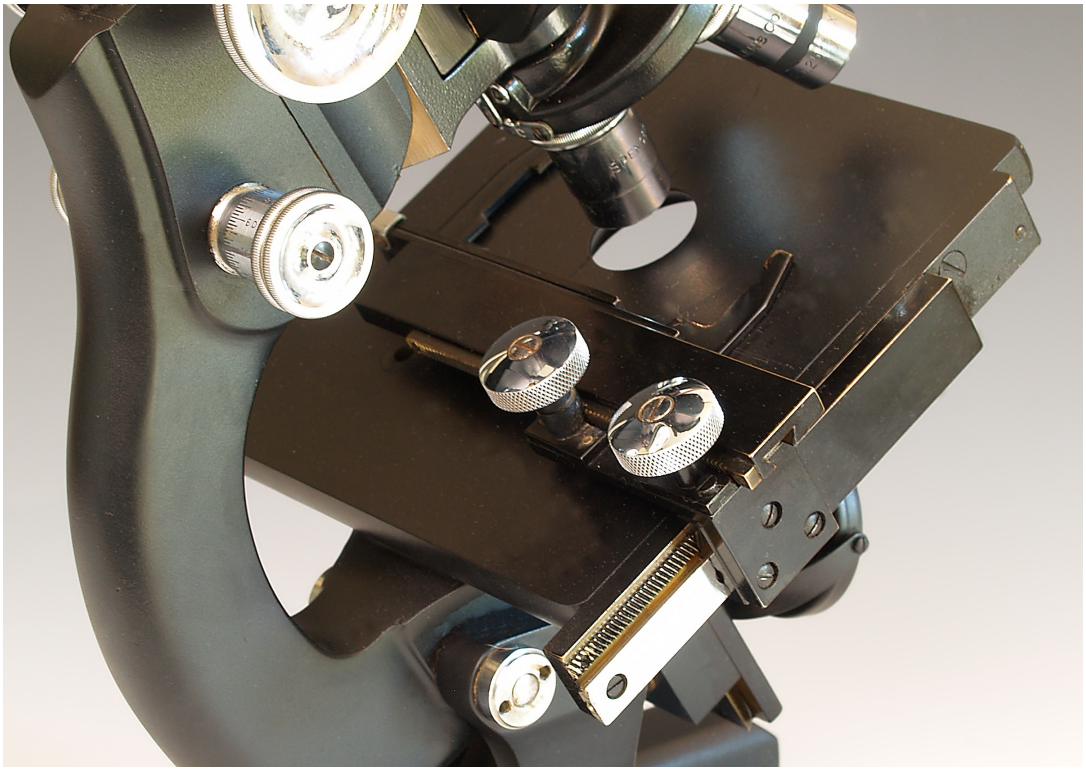
The condenser assembly featured a one-sided mirror – a flat rather than a flat and a concave on the other side.



The condenser has a slot in the bottom to accept filters. The diaphragm lever has markings for values for the aperture settings, from 1.25 to .1. I am assuming the condenser has a numerical aperture of 1.25, since that is the setting when the aperture is wide open.

The mechanical stage is fairly basic and is mounted on a Bakelite stage. It has no longitude or latitude scales.





The objective turret accommodates three objectives.

The objectives that came with this microscope were marked:

SPENCER LENS CO. BUFFALO, N.Y.

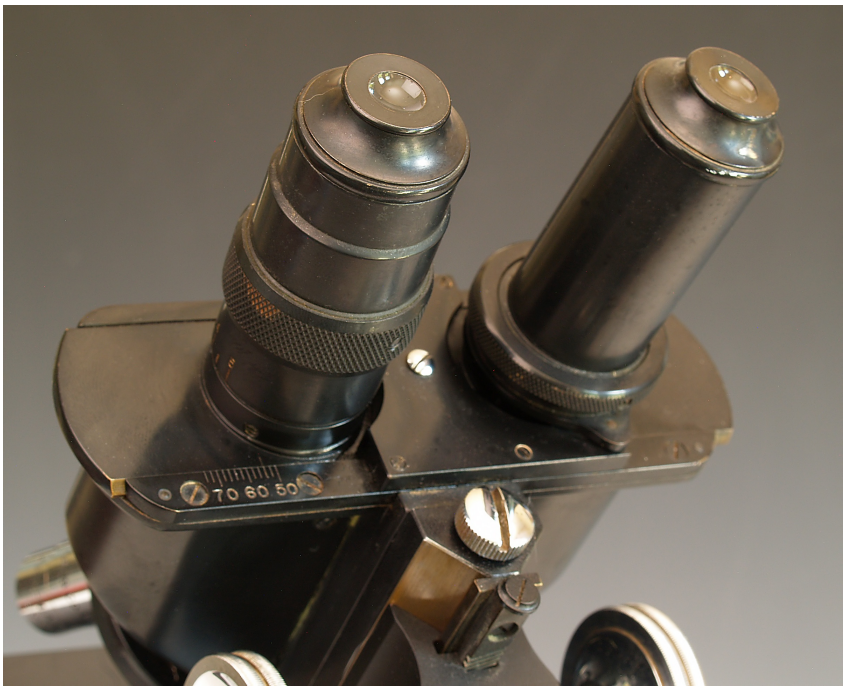
16MM- N.A. 0.25 – 10X
4MM – N.A. 0.66 – 44X
HOM. 1 – 1.8 N.A. 1.25 – 95X

The 95X is an oil immersion objective, and is not spring loaded. At the time of manufacture "HOM." meant "homogenous immersion." From my test I found that the working distance of the 95X was so short that when trying to view a commercially prepared slide with a .20 mm cover slip, the objective was locked down on the slide. Apparently the only practical application of this objective was for specimens not requiring a cover slip, such as blood smears.
One interesting feature of the turret is that the click stops for rotation label the objectives. Today, we are accustomed to the color coding of objectives.

The binocular head has dioptric eyesight correction for only one eye – the left, much like binoculars. Today we have correction for both eyes, which is valuable in trinocular microscopes used in photomicrography.

The adjustment for interocular distance is controlled with a lever at the base of the right eyepiece tube. Interestingly, the magnification value

of the 10X eyepieces is engraved on the eyepiece barrel, along with the catalog number 325A.



A few notes on my restoration techniques

An antique microscope can be restored in three or four afternoons. I have come up with a number of practices which streamline this process.

Disassembly/Reassembly

Microscopes are modular – they are made up of individual components. The first step is to break the scope down into these components: frame, condenser assembly, stage, turret and head. I store all but the frame off to the side in plastic bags. I restore the frame first and then reassemble the scope by restoring all of the components from the bottom up, starting with the condenser assembly.
When I was in the army, I maintained aerial camera and photolab systems. Part of the training as a repair technician was how to service unfamiliar equipment, such as captured enemy materiel that we wished to use.
On my work bench I have a pad of paper. As I disassemble a component, I put the pieces on the paper in sequence, making notes

and drawings underneath each part. Not all screws are the same. I recently purchased a LOMO microscope and out of the four screws holding the stage to the frame, there were two different lengths.
If you disassemble and reassemble one component at a time you will have fewer parts on your workbench to keep track of.
Those little plastic cups for Catsup you can get at your local fast food restaurant make perfect holders for the small parts

Clean Up

The next step in restoration is cleaning up the device. In older microscopes that have been sitting around for a while, the main problem is that the lubricants have dried up and the action of the controls is either stiff or totally locked up.
I degrease the components using naphtha. I have a one gallon paint can filled to three quarters capacity with naphtha. That is large and deep enough to accommodate the top of most microscope frames. If you use naphtha to degrease, it may take several immersions. Between immersions, I use a toothbrush to scrub away any dried shellac and rotate the fine focus from side to side to make sure it is cleaned out.
If you have rusted parts, soak them overnight in naval jelly. It will dissolve the rust, but will blacken the part.
Many components, such as mechanical stages, do not have to be disassembled before degreasing. I keep a pair of kitchen tongs in my work shop to fish the parts out of the naphtha.
I keep some small tin cans such as small vegetable cans or tuna cans in the shop if I need to use a solvent such as acetone, which will dissolve plastic containers.
I use a Dremel electric rotary tool to buff and polish bare metal parts. Using the Dremel felt polishing wheels and tips I polish the brass and chrome parts with Brasso and chrome polish respectively. I use the Dremel wire brush attachments to remove corrosion and to buff chrome parts, such as objective barrels.

Painting

I use a satin black enamel when refinishing old scopes. If there are going to be a nicks in the original finish, it will likely be on the base. This can be smoothed out with sand paper.
I mask all bare metal control surfaces such as dovetail rack and pinion assemblies and knobs prior to painting. I use blue painters' masking

tape and buy it in the 1½ inch width which I can cut down to narrower widths when needed.
I pay special attention to protecting screw holes, lest paint gets in them and clogs the threads. To protect screw holes I use thick pipe cleaners (available at crafts stores), and regular pipe cleaners from tobacconists. For very small screw holes, I use the tapered tips of round toothpicks.
After painting and removing the masking tape, I clean all bare metal surfaces with steel wool. Even a little paint spatter will interfere with the tolerances of dovetail assemblies.

Lubrication

Since most of the microscopes I restore are for display, I lightly lubricate the moving parts with light machine oil applied with an artists paint brush.

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