

## CHROMIUM PLATING FOR THEODOLITE CIRCLES

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In order to protect the very fine lines of the graduations of first-order theodolite circles, which are customarily ruled in 5-minute intervals, the Coast and Geodetic Survey has experimented with the plating of such graduated circles with chromium in order to give the soft silver a hard and non-tarnishing surface. The silver used must be quite soft in order properly to accomplish the graduating work, and one of the serious problems of graduating such circles is to polish the silver properly before graduating and to remove the tiny burrs left by the cutting tool, without marring this polished surface. Subsequently, the silver may tarnish and require re-polishing, and such re-polishing must be done with the greatest care to prevent damage, and the removal of such dust and dirt as may filter into the instrument must also be done with extreme caution to prevent scratching.

With the protecting coating of chromium, which is only a few hundred-thousandths of an inch in thickness, the original polish of the silver is not impaired and a surface is furnished which is so hard that no trouble is experienced in the removal of extraneous matter. The chromium does not tarnish and the silver is therefore practically immune from any damage except such as might be sustained from a sharp blow. The appearance of the chromium surface underneath the microscope is quite pleasing and seems to have a tendency to reduce the glare where artificial illumination is used, thereby enhancing the sharpness of the graduation lines.

Chromium plating is being applied for the Coast and Geodetic Survey by the Bureau of Standards, which conducted the necessary experimental work in perfecting the method. As the Survey understands it, silver does not lend itself so readily to chromium plating as some of the other metals, and, in consequence, this type of work must be performed with greater care and more exactitude than are required in the ordinary chromium plating process.

