

dental change would have been secured if the top face of the frame had each been planed to fit the base of the holder instead of having the latter on feet, provided some side support were added to guard against any possible minute rocking motion.

The microscopes are carried on the external surface of a cylinder, which is cast in the same piece with the base last described.

The fulcrum on which rests each lever supporting the weights of the instrument at one end and the counterpoise at the other is itself supported upon the cylinder carrying the microscopes. This feature of the instrument has been objected to on the ground that the microscope carriers should not be subjected to so great a pressure, which may possibly be subject to vibratory changes as the instrument turns upon the friction rollers. Although it is quite possible that no actual evil results from this cause, it must yet be regarded as a not improbable source of danger to the steadiness of the microscope holders; I therefore consider that it would be better to adopt some other system of supporting the instrument; perhaps upon pillars passing centrally through the microscopes holders and set in the pier below.

The arrangements for clamping the microscopes to the cylinder leave nothing to be desired, provided the former are once got into their proper position. But the task of setting a microscope after it is once disarranged is extremely laborious; and some additional mechanism for effecting this is desirable.

The accuracy with which the divisions on the circle are cut, and the adaptation of the microscope to their reading, are undoubtedly the greatest points of difficulty in the construction of a divided circle of the first order. I am convinced that much must yet be done to secure the best results in this respect. In the Strassburg circle, and in the other recent instruments of the Republique, the diameter of the circle is reduced to two feet. One great advantage is thus secured in that the circle and the microscope are less subject to injurious changes from currents of air of different temperatures. But a drawback is at the same time introduced from this fact that, as the diameter is diminished, any error of a given amount in the position of the division will produce a proportionally greater effect in reading off the angle. Hence, in order that no accuracy may be lost from this cause, the absolute error of the divisions, their sharpness, and the power of the microscopes, must all be increased in the same proportion that the diameter of the circle is diminished.

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