Let A and B be the two points of observation, and let P_1 and P_2 be the images of the distant point P on the picture plane, then x_1 is the ordinate of left image, and x_2 of the right and the difference between AB and P_1 P_2 is the parallax and is obviously equal to $x_1 - x_2$. Let the parallax be denoted by a, equal to the algebraic difference of the ordinates.. It is clear that when the parallax a equals O the point P must be at infinity, and that a increases as P approaches AB, also that all points lying on a vertical plane through P parallel to AB have the same parallax.

Fig. 2 exhibits the parallax of various points in an actual stereograph. The base of the pair of photographs was 2.438 m. and the focal length of the lens was 141 mm.

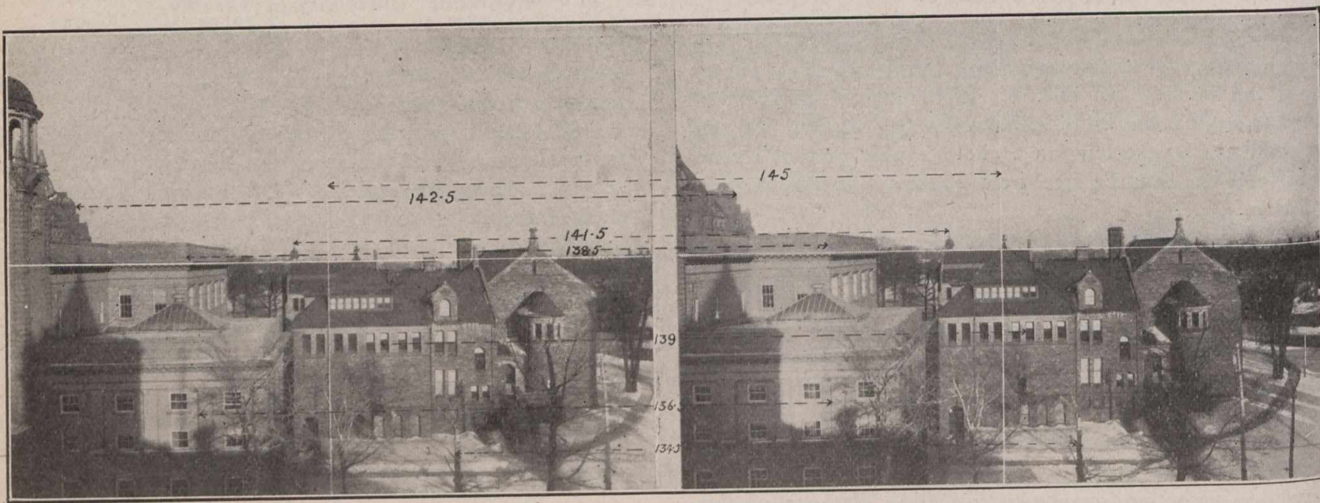

Fig. 2.

Base = 2.438 metres, f = 141 mm.

As the picture is mounted the base is represented by a distance of 145 mm., and the distances between various pairs of points are shown on the figure, from which it is seen that the nearer the points lie to the station the greater the parallax. It must be observed, of course, that the parallax is not a measure of the distance directly to the distant point, but a measure of the perpendicular distance between two vertical planes, one of which passes through the station points and the other through the distant point parallel to the first, in other words the "Z" of a rectangular system of co-ordinates.

In the taking of the photographs it is necessary that the plates be vertical and that they lie in one plane; the stations may be on the same or different levels. The length of the base and the focal length of the lens are required. By convention the left station may be conveniently taken as the point from which measurements are to be made, hence the co-ordinates x and y will be measured from the left plate and the parallax from both.

It now remains to show how the actual co-ordinates of a point in space may be determined from the co-ordinates as measured on the stereograph. In Fig. 3:

Let P be the point whose position is to be determined and which is represented on the plates by the images P_1 and P_2; let the ordinates of these points be x and x^1, (x^1 being negative), let B be the base and f the focal length of the lens. Then, from similar triangles it is evident that Z the

distance of a plane through $P = B \dfrac{f}{x + x^1}, = B \dfrac{f}{a}$

$$\text{also } X = Z \frac{x}{f}$$

$$\text{and } Y = Z \frac{y}{f}$$

Fig. 4 shows the latest model of the stereo-comparator destined for the precise measurement of stereographs, one of which has lately been added to the photographic equipment in the University of Toronto. The instrument is provided with a binocular microscope magnifying eight times, of which the objectives are shown by O_1 and O_2, the eye pieces by E_1 and E_2. The microscope may be focussed on the plates by a screw not visible in the figure, and the eye pieces may be separately adjusted to compensate differences in the eyes of the observer and are also adjustable to different interocular distances.

The plates P_1 and P_2 are rigidly held in place by metal clamps, and are illuminated from beneath by adjustable mirrors M_1 and M_2. Each plate may be rotated in its own plane by screws S_1 and S_2, so that the horizons of the two plates may be accurately adjusted. Also, the right plate P_2 may be moved parallel to its length by the screw H so as to

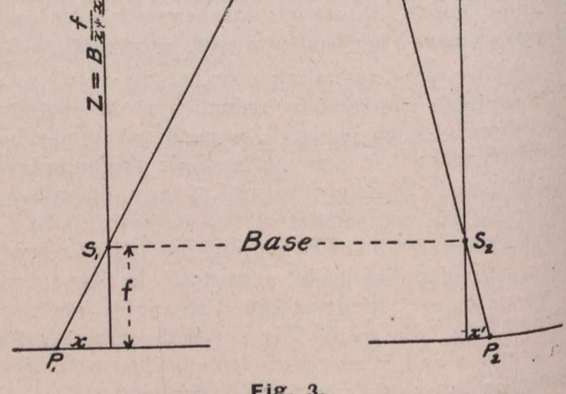

Fig. 3.

compensate for difference in level of the two stations. In the optical planes of the microscope are two balloon marks which appear to coincide when the instrument is in accurate adjustment and may be set so as to apparently coincide with any point on the stereograph whose position is required.