The coefficient of expansion of the nickel-steel shaft has been determined, and its mean value between the temperature 1° C. and 30° C. has been found to be $0{\cdot}000{,}004_0$ per 1° Centigrade.

CALIBRATION OF THE MICROMETER.

The micrometer-screw, as mounted in the comparator, has been calibrated, one of the microscopes belonging to the comparator being set to known distances on one of the Laboratory line standards. During this calibration the micrometer was screwed against the pressure of the springs designed to keep the end of the movable shaft in contact with the end of the screw.

(*a.*) *On the Millimetre Scale.*—The pitch of the screw is approximately 0·5 mm. and the drum is divided into 250 parts: hence one division represents 0·002 mm.

Table 1 gives the corrections to be applied to the readings to annul the progressive error of the screw.

TABLE 1.

Reading of Drum on the Millimetre Scale.	Correction to the Reading.
	Millimetres.
0·0000 ..	$0{\cdot}000_0$
1·0000 ..	$-0{\cdot}000_4$
2·0000 ..	$-0{\cdot}001_2$
3·0000 ..	$-0{\cdot}002_4$
4·0000 ..	$-0{\cdot}004_0$
5·0000 ..	$-0{\cdot}004_6$
6·0000 ..	$-0{\cdot}005_8$
7·0000 ..	$-0{\cdot}007_4$
8·0000 ..	$-0{\cdot}009_6$
9·0000 ..	$-0{\cdot}010_4$
10·0000 ..	$-0{\cdot}010_8$

The micrometer-screw has also a periodic error, which has been found to repeat in each successive revolution of the drum.

Table 2 gives the necessary corrections to the readings.

TABLE 2.

Reading on the Drum on the Millimetre Scale.	Approximate Value of Reading.	Correction.
Divisions.	Millimetres.	Millimetres.
0 ..	0·00 ..	$0{\cdot}000_0$
20 ..	0·04 ..	$+0{\cdot}000_7$
40 ..	0·08 ..	$+0{\cdot}000_9$
60 ..	0·12 ..	$+0{\cdot}000_7$
80 ..	0·16 ..	$0{\cdot}000_0$
100 ..	0·20 ..	$-0{\cdot}001_4$
120 ..	0·24 ..	$-0{\cdot}002_9$
140 ..	0·28 ..	$-0{\cdot}004_1$
160 ..	0·32 ..	$-0{\cdot}004_6$
180 ..	0·36 ..	$-0{\cdot}004_2$
200 ..	0·40 ..	$-0{\cdot}003_3$
220 ..	0·44 ..	$-0{\cdot}002_0$
240 ..	0·48 ..	$-0{\cdot}000_5$
250 ..	0·50 ..	$0{\cdot}000_0$

To obtain the correct value from any reading on this scale it is necessary to add, algebraically, to the reading the corrections of Tables 1 and 2. For example, the reading 4 mm. + 100 divisions becomes $(4{\cdot}200 - 0{\cdot}004 - 0{\cdot}001_4) = 4{\cdot}1946$ mm. when corrected.

(*b.*) *On the Link Scale.*—This scale is inclined to the axis of the micrometer-screw at about 60°. One division of the drum read on this scale represents 0·00001 of a link.

The progressive error of the screw is corrected by applying the corrections of Table 3 to the readings taken in this scale.

TABLE 3.

Reading of Drum on the Link Scale.	Correction to the Reading.
	Links.
0·000 ..	$0{\cdot}00000_0$
0·005 ..	$-0{\cdot}00000_3$
0·010 ..	$-0{\cdot}00000_7$
0·015 ..	$-0{\cdot}00001_4$
0·020 ..	$-0{\cdot}00002_1$
0·025 ..	$-0{\cdot}00002_5$
0·030 ..	$-0{\cdot}00003_0$
0·035 ..	$-0{\cdot}00003_9$
0·040 ..	$-0{\cdot}00005_0$
0·045 ..	$-0{\cdot}00005_4$
0·050 ..	$-0{\cdot}00005_6$

Since more than a revolution of the screw is required to give 0·0025 link, the periodic error does not quite repeat on this scale, and in Table 4 are given the values of corrections to be applied to readings at various points of the scale.