tendency to remain slightly below the desired value. The special series of measurements conducted at atmospheric pressure to determine the difference between the temperature of the interior of the pressure vessel and that of the bath indicated, however, that in general the temperature in the vessel slightly exceeded that of the bath. This difference, averaging about 0·0005 degC with a range of from — 0·0005 to + 0·0010°C, thus tended to offset the error in the temperature of the bath itself. It was finally concluded that any *systematic* departure of the temperature of the interior of the pressure vessel from the desired value 0°C was unlikely to exceed ± 0·001 degC, corresponding to an equivalent error in the measurement of the freezing pressure of the mercury of about ± 0·2 bar.

The total systematic error may therefore be taken to be within the limits ± 1 bar.

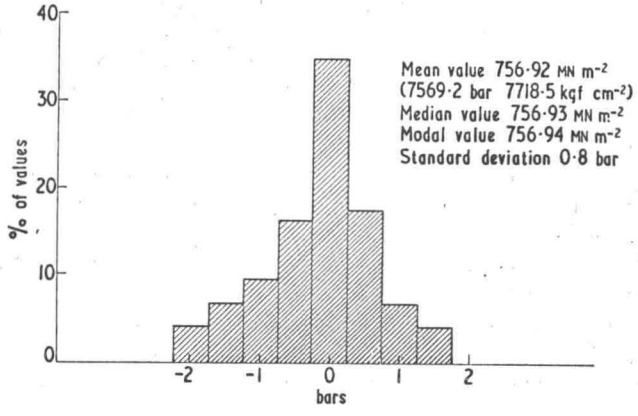

Figure 4. Dispersion of results (74 measurements).

The random dispersion of the whole series of results is shown in the histogram in figure 4. The distribution is reasonably symmetrical and a fair approximation to a normal distribution having a standard deviation of about 0·8 bar. The median and modal values, 756·93 and 756·94 MN m^{-2} respectively, lie very close to the mean. Since, other things being equal, a variation in the temperature of the mercury cell will undoubtedly entail a variation in the freezing pressure, the effects of temperature dispersion may be regarded as included in the total dispersion observed, the remaining dispersion arising from minor departures from equilibrium of the pressure system with possibly other small unidentified effects. The observed standard deviation corresponds to a standard error of the mean of about 0·1 bar, or an uncertainty of about ± 0·2 bar on the basis of 95% confidence limits.

We consider it reasonable therefore to attach to the mean value stated above a total uncertainty of ± 1·2 bar.

3.3. *Comparison with former published results*†

The first considerable investigation of the freezing pressure of mercury as a function of temperature was that of Bridgman (1911) whose measurements covered the temperature range from about — 20 to + 21°C. He adopted both the electrical resistance change and the volume change methods, arriving at a final value for 0°C of 7640 kgf cm^{-2}. This value is thus about 1% low compared with the more recent determinations. It may be of interest to observe, although this may be mere coincidence, that Bridgman's electrical resistance data obtained in 1909, to which he attributed less accuracy than his later work in 1911, gave

† For ease of comparison with other published results the unit kgf cm^{-2} is used throughout this discussion (1 kgf cm^{-2} = 9·806 65 × 10^4 N m^{-2} = 0·980 665 bar).