acting on the piston, A_0 the latter's area and P_{atm} the atmospheric pressure at a given moment; thrust resulting from the application of Archimedes′ principle have been discarded here, as being incorporated in trivial corrections. For simplicity's sake and with a view to taking frictions and distortion into account, one continues to represent the pressure by the simple formula $p = (F/A_e) + P_{atm}$, in which the symbol A_e is put instead of symbol A_0, A_e being the "effective area" of the piston. All the difficulties of the problem are concentrated in the symbol A_e, which is a function of the pressure still to be determined and considerable efforts are made by theoricians and experimenters with a view to improving their knowledge of this function.

The theory of the pressure balance has been built up by DEFFET and TRAPPENIERS [1954], who to this purpose made use of a bibliography going up to the year 1950. A pressure balance based on this theory and measuring pressures up to 3 kb (see fig. 1bis) has been constructed by the "Compagnie des Compteurs et Manomètres, Liège". But since that time, the situation has improved.

The experimental determination of A_e has been made by using two methods. NEWITT and his collaborators developed a method, in which the pressure balance is compared to a mercury column, submitted to a counter-pressure. The first results of this method described by BETT, HAYES and NEWITT [1954] have been published by BETT and NEWITT [1962] and show, that the effective areas of the piston, when an appropriate fluid is made use of, is practically a linear function of the pressure.

DADSON [1957] developed an other method, which consists in comparing two piston-cylinder assemblies, geometrically quasi identical, but made of different materials. Here too, the results obtained by using this method, show that A_e is a linear function of the pressure. The slope of the straight line representing this function depends upon the fluid utilized. The paraffin oil makes however an exception and causes A_e, to vary regularly but not linearly.

From a report not yet published but kindly communicated to us by R.S. DADSON [1963], we extract further valuable information. Dadson's method has been extended up to 7 kb. and successfully tested by means of a third material of comparison. The distortion coefficients of the pressure balances are actually known with an accuracy reaching 2% or 3%. The effective areas are known with an overall accuracy estimated at 1 part in 10^5 at low pressure and at about 8 parts in 10^5 at the upper end of the range. Dadson's method has been also successfully tested in a fully independent way by comparing the leakage rates of flow. On the other side air-operated pressure balances made it possible recently to measure pressures well below 1 b by weighing them and by so doing, to measure a range of pressures, which historically were measured by making use of the mercury column. The measures made by means of columns and by means of pressure balances are in agreement to the order of 1 part in 10^5, as far as their common working interval is concerned.

The question would be incompletely dealt with in this section if we would not say anything about certain characteristic pressures, which in the pressures measuring technique would play the same role as the fixed points in thermometry, when these characteristic pressures will be known with the desirable acuracy. The vapour pressure of the carbon dioxide at the water freezing point is the best known of above-mentionned characteristic pressures. MICHELS *et al.* [1950] found that it was equal to 34.391 atm which corresponds to 34.400 atm at the temperature of the water triple point; values found by other experimenters are quoted in this article. BRIDGMAN [1949] pointed out other interesting characteristic pressures. The mercury freezes at the water freezing point under a pressure of 7 640 kg cm^{-2} but its temperature coefficient is very high :

$$(\partial p/\partial T)_v = 210 \text{ kg cm}^{-2} \text{ deg}^{-1}.$$

The bismuth I–II transition occurs under a pressure amounting to 25 200 kg cm^{-2} approximately. The different water triple points are connected with following characteristic pressures :

$$(l \text{ — I–III}) \approx 2\,000 \text{ kg cm}^{-2},\ (l \text{ — III–V}) \approx 3\,500 \text{ kg cm}^{-2},$$

$$(l \text{ — V–VI}) \approx 6\,300 \text{ kg cm}^{-2},\ (l \text{ — VI–VII}) \approx 22\,000 \text{ kg cm}^{-2}.$$

R.S. DADSON [1963] mentioned in his private communication, that the value found at the National Physical Laboratory (Teddington) for the mercury freezing pressure at a temperature of 0°C is equal to 7 720 kg cm^{-2}, and exceeds thus by 1% the value published by Bridgman; on the other hand, the value found for the vapour pressure of the carbon dioxide is nearly equal to this one found by Michels.

3. The Elastic Equilibrium of a Thick-Walled Cylinder

Les us consider a cylindrical wall submitted to an internal pressure p_1 and an external one p_2. The outer and inner radii are indicated by r_1 and $r_2 = kr_1$; k is the diameter ratio. One intermediate radius is preferably indicated by lr_1; l varies from 1 to k, when r varies from r_1 to r_2. σ_t being the