Charles's Law *or* **the Law of Gay-Lussac.**—*The volume of a gas increases (or decreases) $\frac{1}{273}$ of its volume at zero for every degree rise (or fall) in temperature.*

(It must be carefully observed that it is $\frac{1}{273}$ of its volume *at zero.* Thus, if a gas at 20° is heated to 21°, it will not expand $\frac{1}{273}$ of what its volume is at 20°, but $\frac{1}{273}$ of what its volume would be at 0°.)

Suppose now that we start with a certain volume of gas at 0° and cool it to − 1°, it will contract $\frac{1}{273}$ of its volume; if we cool it to − 2° it will have contracted, in all, $\frac{2}{273}$ of its original volume. Finally, if we could cool it to − 273° it would (theoretically) lose $\frac{273}{273}$ of its original volume, *i.e.*, its volume would become 0. As its volume cannot become less than 0, we argue that there is no temperature below − 273°C. This is *absolute* cold, and the temperature is called *Absolute Zero.* A thermometer-scale, with degrees the same size as centigrade degrees and this point labelled zero, is called the *Absolute Scale.* 0°C. becomes 273° on the absolute scale and 100°C., 373° absolute.

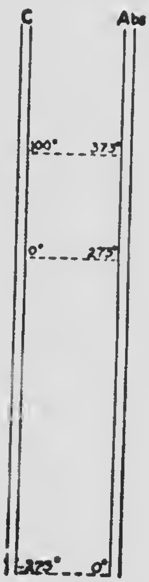

FIG. 10.

This may be formulated as follows

$$\text{Abs.}^\circ = \text{C.}^\circ + 273^\circ \quad \text{or} \quad \text{C.}^\circ = \text{Abs.}^\circ - 273.^\circ$$

Further, let us consider a volume of gas which, for convenience in calculation we choose as 273 cc., at 0°C., *i.e.*, 273° Abs. If we raise the temperature 1°, the volume will be 274 cc., and so on; and similarly for lowering of temperature, as indicated in the table:

Vol.	C.	Abs.	Vol.	C.	Abs.
276 cc.	3°	276°	272 cc.	− 1°	272°
275 "	2°	275°	271 "	− 2°	271°
274 "	1°	274°	270 "	− 3°	270°
273 "	0°	273°		etc.	