## THREE STATES OF MATTER.

elves to om ves-

adapts poured? 's are a ers are s when ids are

ecause device isible.

l crack ancing sily the e from

rtially piston chaust

wantrfect. onseumes. while ne. d we defil of their that ssel, com-

4.5

pression of liquids is barely perceptible, even when the pressure is very great.

§ 17. Philosophy of the three states of matter. - We conclude from the difficulty which we experience in separating the parts of a solid body, that the molecular attractive force in solids is very great. From the case with which we usually separate the parts of a body of liquid, we might conclude that this force in liquids is very weak. But before arriving at any conclusion, it is necessary to consider how the difficulty of separation of the parts of a liquid is to be measured. It is very easy to tear off a portion of a sheet of tinfoil, but we should not surely regard this as an evidence that the molecules of tin have but little attraction for each other, for in tearing such a body we only apply the force to a comparatively few molecules at a time. We can form a just estimate of the strength of molecular attraction only by attempting to separate the foil into two portions by such means as that the separation may take place no sooner at one point than at another. So, too, it is very easy to separate a drop of water into two portions, but this is no measure of the attractive forces unless we take precautions that we do not apply the separating force successively to different molecules. If we succeed in preventing such a successive action, and there are certain methods of doing this more or less perfectly, we should find the process much more difficult, - more so, indeed, than to produce a similar change in many solids.1

There is, however, a difference in the molecular action in solids and liquids; such that, in the latter state, the molecular forces offer no resistance to a *shaping* force, while in the former state, change of shape can only be brought about by the application of considerable force.

In a gas, on-the contrary, there is little attraction between the molecules; but as they are constantly hitting one another, and thereby tending to drive one another apart, it requires an external force to keep them together.

\* The cohesive force of water is at least 132 lbs. per square inch. - MAXWELL,

21