

two pistons of a different section integral one with another. The piston of a big diameter, when moved by a fluid at a low pressure transmits a considerable thrust to the piston of a small diameter, whereas the low pressure fluid is changed into a high pressure one. This device is called a "pressure intensifier".

A piston-cylinder assembly may be made tight by placing a packing either at the end of the piston or at the cylinder inlet. If the first solution is chosen for solving this problem, the bore of the cylinder must be ground. The packing rather quickly wears down but high pressures can be reached. When a screw injector works up to a pressure of 3 kb, we always place a packing at the inlet of the cylinder. By so doing, the piston becomes a simple volume reducer and the cylinder needs not to be ground. Figs. 1a-c schematically show a Bridgman's packing a Poulter's packing and an O-ring seal mounted at the end of the piston. Figs. 1d and e show an Amagat's fully enclosed packing and an O-ring seal, placed at the cylinder inlet.

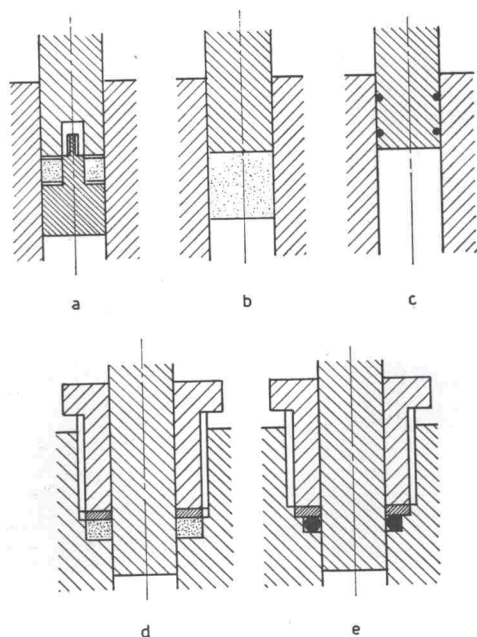


Fig. 1.

A packing mounted at the end of the piston ceases to work correctly, when the pressure exceeds a value of say 30 kb. Pressures above this level can only be engendered by applying the crushing process. BRIDGMAN [1941]

enclosed liquids in capsules of lead or of indium. The capsule put into the cylinder was crushed by the piston. The lead is sufficiently plastic for developing a pressure in the liquid and sufficiently viscous for not leaking past the piston. The pressure reached 50 kb. DAVID and HAMANN [1956] applied the crushing process to a polyethylene capsule, closed by a plug made of "teflon". By so doing, they could submit to a pressure of 45 kb a liquid as fluid as methanol.

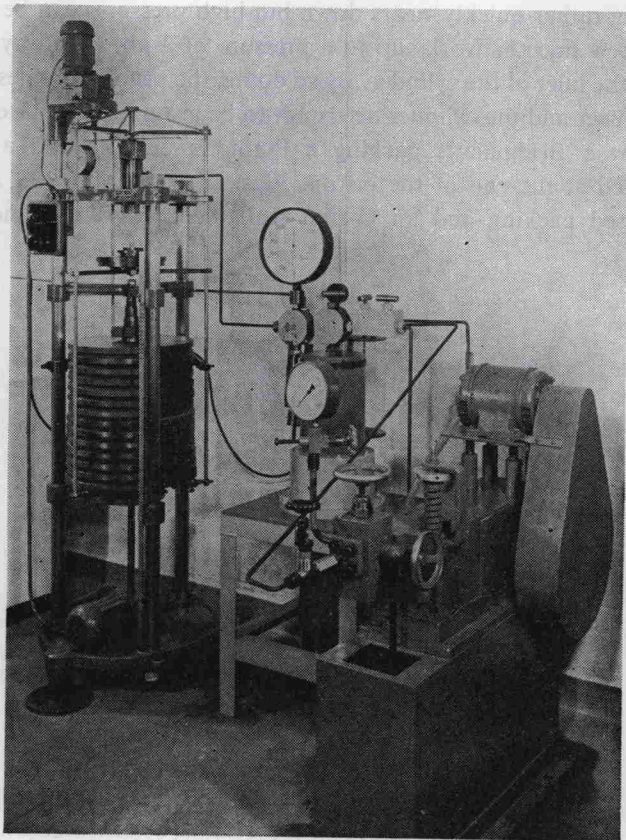


Fig. 1bis.

For the time being, the crushing process is usually applied to small solid samples, which are to be simultaneously submitted to pressures amounting to several hundred kb and to very high temperatures. These techniques are however too specialized ones for being dealt with here.