pressures greater than 2000 atm in large chambers can be produced only with machines having a special system of seals. Hydraulic compressors, continuous piston-type devices with the piston rod sealed with a flexible metal sleeve, are used to create pressures up to 12,000 to 15,000 atm in liquid and 5000 atm in gas. A great variety of such compressors is available, and they all work steadily and reliably. L. F. Vereshchagin, Corresponding Member of the Soviet Academy of Sciences, was awarded the State Prize of the USSR for developing the theory and design of hydraulic compressors, original Soviet pressure generators.

Hydrostatic pressures above 15,000 atm cannot be produced with pressure generators in chambers of arbitrary size; single-pass boosters are used for this purpose.

The famous American scientist, P. W. Bridgman, who developed the so-called incompressible seal, has experimented with hydrostatic pressures up to 50,000 to 70,000 atm. Attempts to increase the pressure above that point with simple boosters were unsuccessful, because the piston broke. This raised a fundamental problem: can the pressure be raised numerically higher than the strength of the container material? In the case of the booster, the problem amounted to the following: to create a pressure of 80,000 atm under the piston of the booster (fig. 1a), the piston would have to withstand a compressive force of the same magnitude, which cannot be accomplished with present materials. The best steels have a compressive strength of only 25,000 atm, the strongest hard alloys (e.g., tungsten carbide with 6% cobalt) have compressive strengths of 50,000 to 70,000 atm.

This difficulty, which arose in developing high-pressure apparatus, was overcome because the strength of the material increases with increasing pressure. Employing this principle, Bridgman attained a pressure of 100,000 atm using a device comprised of a booster within a booster, i.e., a booster with a hydrostatic support.