LABORATORY TECHNIQUES

A Multiplicator Piston Seal for Compressing Helium

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Abstract—A modified seal of a multiplicator piston, which ensures that it will reliably operate during multiple compression cycles in helium medium, is described.
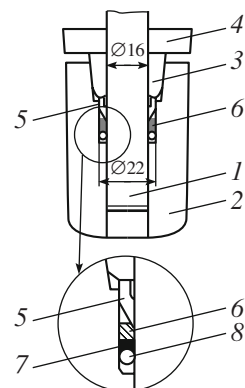
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The idea behind the gland seal for a multiplicator piston in [1] was proposed by Bridgman for sealing permanent connections [2]. This seal has been used to good effect in the author's laboratory while compressing liquids and some inert gases. However, systematic experiments with helium revealed that the seal described in [1] stops satisfactorily operating after a limited number of cycles of compression to pressures of ~10 kbar. The seal [1] has been modified to ensure long-term serviceability in compressed helium medium (figure).

The modified seal differs from that described in [1] in the configuration of load-bearing bush *5* (figure) made of ХВГ tool steel. As seen in the figure, the gap between the inner diameter of bush *5* and piston *1* is controlled by the wedging action of sealing ring *6* made of beryllium bronze. To decrease the friction of the surface of bush *5* and ring *6*, which touch hard-alloy piston *1*, they are coated with a thin indium layer.

This experimental work demonstrated reliability of the modified seal design when helium was compressed to pressures of up to 10 kbar.

Modified seal of the multiplicator for compressing helium: (*1*) piston, (*2*) multiplicator housing, (*3*) support bush, (*4*) support, (*5*) load-bearing bush, (*6*) beryllium bronze ring, (*7*) kapron guard ring, and (*8*) O-shaped rubber ring.

REFERENCES

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2. Bridgman, P.V., *Fizika vysokikh davlenii* (Physics of High Pressures), Moscow: ONTI, 1935.