Fig. 2. The bulk moduli of the constituent phases of dental amalgam as functions of pressure.

Discussion

There are many factors, either singly or in combination, which could be responsible for the apparent slope changes observed previously in dental amalgam[1] and also in the γ and γ_2 velocity data (see Table I and Figs. 1a and 1b). Such changes could arise from the experimental configuration; although the pressure calibration is

TABLE II

The Elastic Constants of the Constituent Alloys
of Dental Amalgam at Atmospheric Pressure
(All Moduli in 10^{12} dynes/cm²)

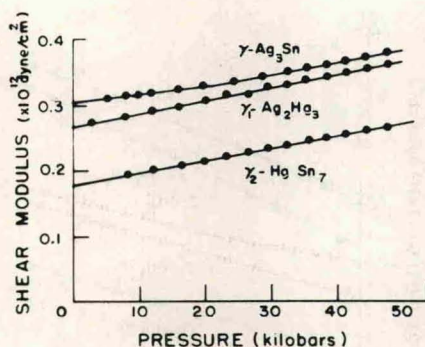| Alloy	Bulk modulus	Shear modulus	Young's modulus	Poisson's ratio
γ–Ag_3Sn	1.01	0.307	0.836	.36
γ_1–Ag_2Hg_3	0.871	0.269	0.731	.36
γ_2–$HgSn_{7-8}$	0.567	0.181	0.491	.35

Fig. 3. The shear moduli of the constituent phases of dental amalgam as functions of pressure.

periodically checked, small changes might occur during data runs. Additional changes could arise from the non-hydrostatic geometry of the pressure apparatus and its effect on materials with quite different plastic deformation properties.   Another possible factor is the intro-duction of porosity in the form of microfissures and cracks due to fracturing during stress release.

The analytical calculation itself may be a contributory factor.   The analytic computations involve, as part of the boundary conditions, the pressure dependence of the elastic properties of the pyrophyllite gaskets.   This input data has been derived from previous experi-ments.[3] However, each data run requires two new pyrophyllite gaskets, and although the gaskets were prepared from a large block of material, small variations in physical properties could occur, thus affecting the calculations.

In addition to these factors, the intrinsic properties of these materials may change due to electronic realignments or phase trans-formations due to the high pressure.   These factors are presently under investigation.   Although the changes detected in the slopes of the ultrasonic velocities of γ and γ_2 are not sufficient to determine whether phase transitions are actually occurring at high pressure, such transitions appear possible based on structural considerations and will be discussed later.

The elastic properties of primary importance are those at atmos-pheric pressure.   It is evident from Figs. 2, 3, and 4 and Table II that the elastic constants of γ_2 are considerably less than those of γ