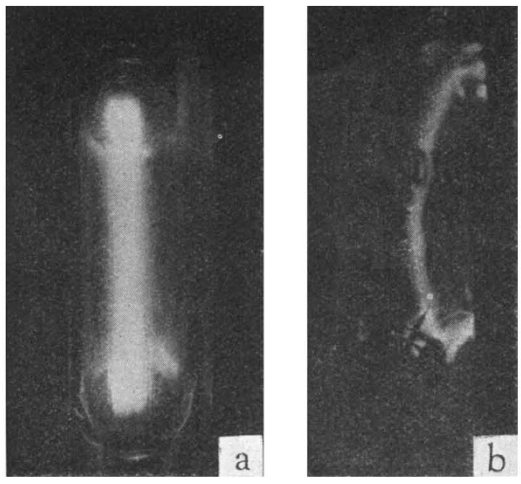

Fig. 2

typical pictures : (*a*) is taken in the symmetry plane of the torus with helium gas at 50 torr pressure when the plasma current has reached its peak value at 25 k.amp. At higher pressure it is necessary to pre-ionize the gas by running a pulsed discharge current of 100 amp. between a number of internal electrodes placed around the torus. Fig. 2*b* shows half of a circular discharge at 400 torr. The picture is taken at an angle to the symmetry plane at the peak value 17 k.amp. of the circulating current. Streak camera pictures indicate that when the gas pressure is high, the plasma looks more regular and stable than at low pressures. Further experiments are in preparation.

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Motion of Molecules in Very Thin Films between Sliding Surfaces

C. L. Gaines[1] has recently discussed the motion which long-chain polar molecules in mono-molecular layers on solid surfaces may undergo. His work leads to considerations of lubrication phenomena which he reports in progress.

Some results which may be related to the study have occurred in sliding studies of optically flat lapped steel surfaces, where the film thickness of stearic acid was that of only several molecular layers.

Information on the structure of the film for room temperatures (well below disorientation temperature) was obtained from observations on the magnitude of the changes in the tangential force at the commencement of, and during, sliding with 'stick-slip' type action. Automatic recording[2] of thirty tangential force-time diagrams for the sliding surfaces was used as in earlier surface sliding work[3], and the results processed to obtain the frequency polygon of all changes in the tangential force, F_T. The magnitudes of the changes in F_T tended to be grouped around multiples of a definite value '*a*', as indicated in the frequency polygon of Fig. 1. This could suggest that sliding can occur at definite strata-levels, and perhaps overturning of the molecules at these levels. Changes in the shearing strength of the film are registered as changes in F_T. In some, but not all, cases, there was micro-interferometric evidence of surface damage and this could not be correlated with the force measurements. It would seem that, although the changes in the shearing strength of any cold-welded metal asperites had contributed to the change in F_T, the final frequency polygon indicates that the changes were mainly due to different shearing strengths of the film at different levels, corresponding to integral multiples of the value at '*a*'.

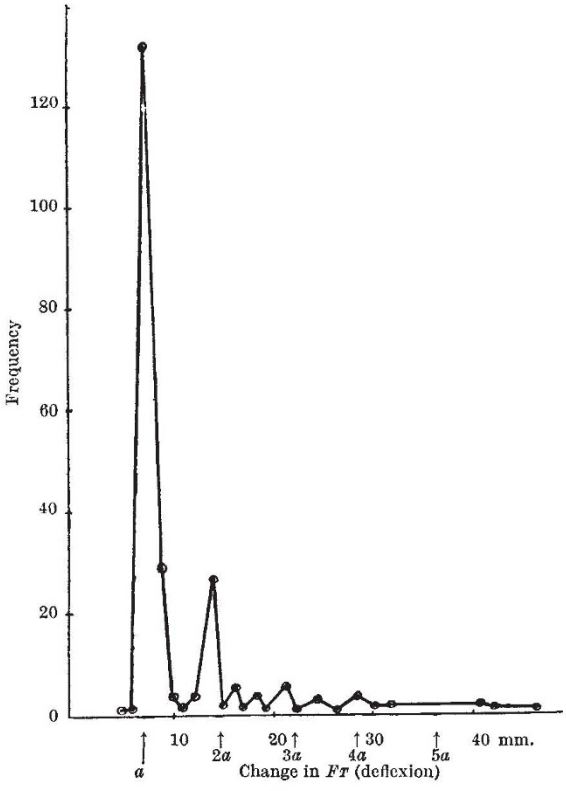

Fig. 1

It would seem that sliding had occurred at selected planes of slip (with overturning ?) which exist by virtue of the molecular surface orientation forces ; there would be a low probability of a slip occurring at a molecular plane very close to the metal surface where orientation forces are strongest, but the probability increases for molecular planes further removed from the surface.

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