CHAPTER 5

DISCUSSION

The results (Figs. 4-1., 4-3., 4-5.) show that the coefficient of friction decreases with an increasing speed, because at a high speed the increasing oxidation is more than enough to offset an increase in the forces of interaction between the surfaces. The decrease in the coefficient of friction is probably associated with lubrication by a layer of molten brass. Both cases are involved with high temperatures. The speed and the geometry of the bodies on the surfaces influence the surface temperature. Although a pair of mating surfaces have a common temperature at points of true contact, their overall average temperature can differ considerably.

For the friction force, the formular $F = A\ S$ is used in which A is the sum of all the welded surface parts and S is the thrust force necessary for the shearing off process. Surface A is again proportional to the normal force W with which the metal surfaces are pressed together so that the known relationship $F = \mu\ W$ is arrived at, in which the friction is proportional to the normal force. The proportionality is called the frictional coefficient. From assumption, it is possible to represent the effect of vibration in such a way that, through the vibration, on the one hand the welded surface part is augmented but on the other the thrust necessary for shearing off is so sharply reduced that, externally, a reduction in friction is effected.

In the case of the direction of vibration being perpendicular to the sliding surface (Fig. 4-1.), the normal force is really only effective intermittently and for this reason it is that much greater at the moment of elastic rebound. However, a reduction in friction is still achieved.

In the case of the direction of vibration being parallel (Fig. 4-3.) and perpendicular (Fig. 4-5.) to the sliding surface but in the same plane, parts of the surface of the slider weld temporarily with the rotating ring and are thereby torn from the surface.

In Figs. 4-7., 4-8., 4-9., 4-10., photographs were taken from various conditions.
Oscillating force were shown in Figs. 4-7., 4-8., light and heavy vibration applied on the stationary steel ring.

In Figs. 4-9., 4-10., the steel ring was in motion, friction force was shown both without and with vibration.

Referring to Fig. 4-8., the average normal force was lower than half of the vibrating amplitude. This may be the reason for a decrease in frictional force.