Riders in both rotary and flat-bed machines, besides spreading the ink film, are also given a controlled movement of up to an inch or two across the machine, thus applying a high shearing stress to even up the film thickness from side to side of the press, and to eliminate residual thixotropy.

The assumption made above that the ink film splits evenly between the various surfaces it contacts is not strictly true in practice, and a transfer coefficient must be introduced. This factor may vary not only for every pair of surfaces but for different inks, and at different rates of shear for the same ink. If an ink has a poor transfer coefficient at the desired machine speed, then to maintain the final necessary film thickness, the film thickness at the duct end will have to be increased to produce a profile as in Curve C, Figure 8.16. This results in an unnecessarily large amount of ink being out on the machine to heat up, oxidise, lose solvent, or otherwise deteriorate, or else the forme will become starved of ink and begin to print spare. In all such cases, pigmentation of the ink must be reduced or, alternatively, the rate of shear decreased. This is the main reason why inks for high-speed presses must be thinner as the speed increases.

Theories of Film Splitting.—We have discussed the mechanics of the formation of films on rollers; we now come to the physics.

In 1938, Reed described the Inkometer (*q.v.*), an instrument designed to simulate the conditions of film splitting on a printing machine. The Inkometer measures a restoring couple equal to the force exerted by the ink film being distributed between two rollers, and this in practice is found to give useful data when several inks of similar composition are compared. When inks of widely different composition are compared, the Inkometer readings are more difficult to interpret and many attempts have been made to convert such data into more fundamental units. Zettlemoyer *et al.* (*Intern. Bull.*, 1956, No. 73, p. 60) have described experiments which indicate that the Inkometer reading can be related to ambient pressure, thus implying that cavitation (*vide infra*) may be a governing factor.

In the simplest case of film splitting—a sphere rolling by gravity down an inclined plane coated with a film of a Newtonian fluid—it is found impossible in practice to prevent movement by a combination of rolling and sliding. It seems likely, therefore, that a certain amount of skid always occurs on friction driven rollers, and that a correction for this may be necessary in Inkometer experiments. Viscosity would seem to play some part in determining the work required to split the film. Surface tension effects must also be involved but an equal number of interfaces are being made and destroyed, and for most inks the ink/air interfacial tension is small and cannot be varied very much.

The ink property responsible for distribution is known to the printer as "tack," and he subjectively assesses the amount of this by resistance to separation of finger and thumb when both are wetted with ink, *i.e.*, the printer uses his digits as a parallel plate viscometer under tension. A mechanical finger was devised by Green in 1941, and known as the Tackmeter (*Ind. Eng. Chem.*, 1941, **17**, 458). Green found, however, that the tack he