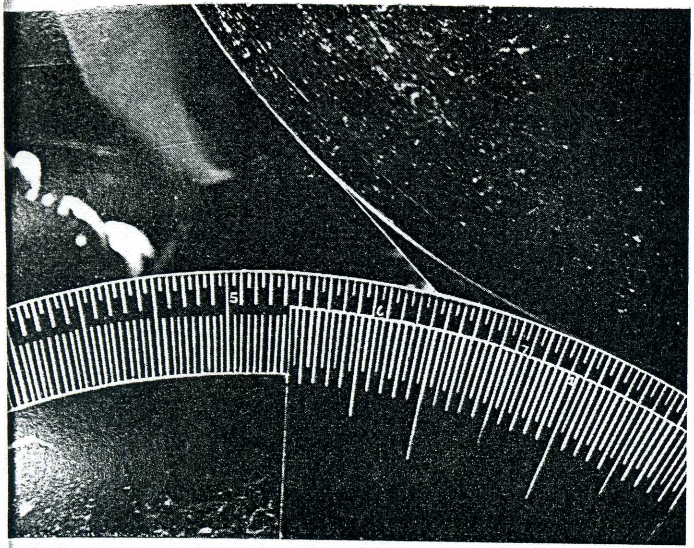

Fig. 4—High-speed offset litho printing and peeling

Graphs of angle of peel against sheet position, from front to back edge, for a variety of papers are shown in Fig. 6: the figures refer to the basis weight of the paper. The results of the angle of peel determinations suggest that—

1. Each paper has a tendency to peel at one particular angle.

2. Smooth papers of low air permeability peel at a greater angle than rough, more air permeable papers.

3. Papers printed in the cross-direction round the cylinder peel at a greater angle than those printed in the machine-direction round the cylinder.

4. The papers of higher basis weight peel at the lower angle.

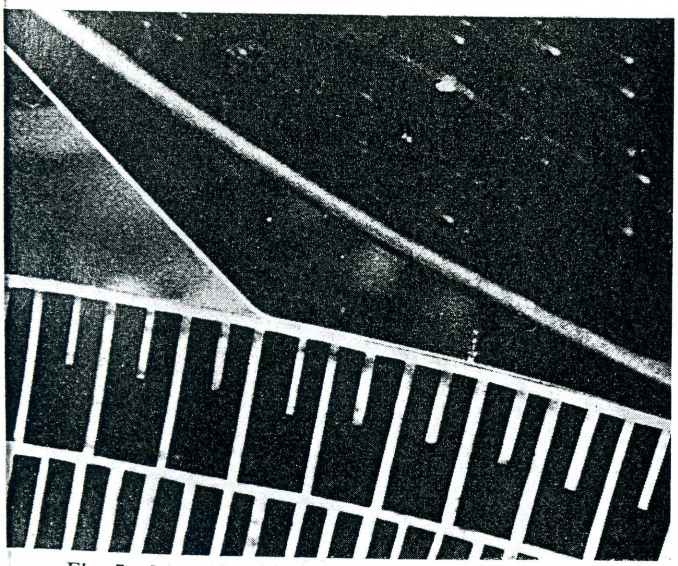

Fig. 5—Magnification of 1.7× actual size of the peeling zone

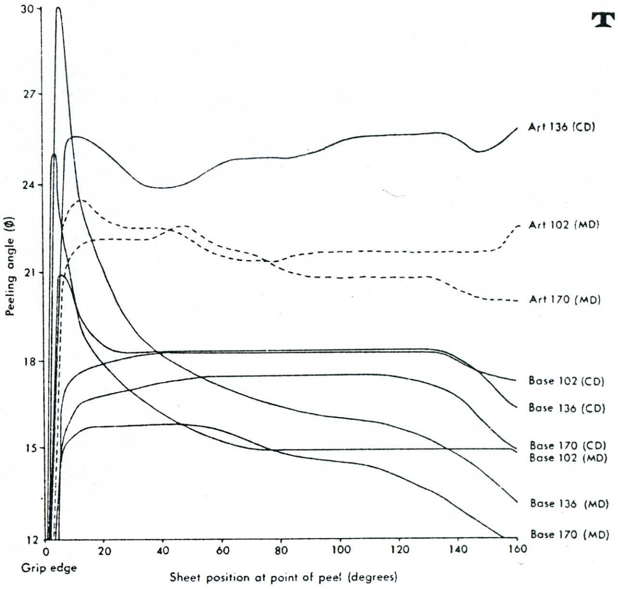

Fig. 6—Variation of peeling angle with sheet position

5. The angle of peel increases from front edge to back edge for smooth papers of low air permeability and decreases for rough papers of high air permeability.

All the above points are satisfied by a mechanism of peeling based on the promotion of cavitation, filament formation, elongation and rupture as originally postulated by Banks and Mill.[8] The four most important paper properties with respect to peeling are (*1*) smoothness and (*2*) air permeability, in the role of cavitation inhibitors or promoters; (*3*) direction of printing and (*4*) basis weight, as they affect the flexural rigidity of the sheet and its ability to support a bending moment at the peeling zone without collapse; other factors being (*5*) speed of peeling, (*6*) ink tack and (*7*) impression pressure.

The angle of peel φ cannot be considered in isolation, its value is determined by the paper tension P and the work of stripping W required to peel the paper from the inked blanket. Values of the work of stripping (W) were determined from the expression[9]

$$W = P(1 - \cos\varphi)$$

paper tension being determined from the ciné film measurements and nip geometry in conjunction with stress/strain curves.[10] The values of the work of stripping were still in the correct order as predicted by cavitation theory and the above paper properties of importance. The values of W lay in the range 33–208 $\times 10^3$ erg/cm^2. These compare favourably with the values of Truman and Hudson[11] [11–154 $\times 10^3$ erg/cm^2] and Voet and Geffken[12] [3–100 $\times 10^3$ erg/cm^2].

We tested the load/elongation properties (Instron) of the papers before and after printing in order to