DISCUSSION

C. C. S. Yen[1] *(written discussion)*—Schulz,[2] in a number of papers published between 1922 and 1945, found that rest periods improved the fatigue life of various steels. In 1948 and 1949 Freudenthal et al,[3] in a study of thermal activation, conducted statistical analyses of extensive fatigue test data and concluded that resting at 350 F indeed improved fatigue life of 1045 and 4340 steel. However, it was also found that a resting period slightly reduced the life of fully annealed electrolytic copper and aluminum alloy 7075-T6. In 1963 McEvily et al[4] showed that resting or aging at 150 C (302 F) for 3 h slightly reduced the life of 2024-T4 alloy, but aging at 150 C for 16 h markedly increased the life. All the above results are in the long- or intermediate-life region.

The intriguing complexities of metal behavior under repeated stressing or straining still defy a quantitative prediction of the fatigue life of an actual machine part as influenced by a rest period. In view of the current state of our knowledge, the present paper is an important contribution. I believe that greater effort should now be expended on the study of the effect of a rest period for objectives on both scientific and industrial fronts. Scientifically, the fatigue mechanism as related to dislocation dynamics, thermal activation, alloy reversion, strain aging, etc., can be better understood. Industrially, the results of study may be used beneficially to improve the product life and to prevent failure. I believe that if the effects of resting at ambient temperatures are well known, everybody could use the results of study for better control of the service life of automobile and other machine parts.

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[2] Schulz, E. H., *Stahl und Eisen*, STEIA, Vol. 60, 1940, p. 100; *Archiv fuer das Eisenhuettenwesen*, AREIA, Vol. 12, 1938, p. 141 and Vol. 18, 1945, p. 155.

[3] Freudenthal, A. M. et al, "Materials Behavior Under Repeated Stress," 8th and 12th Progress Report, Engineering Experiment Station, University of Illinois, Urbana, Ill., 1948–1949.

[4] McEvily, A. J., Jr., et al, *Transactions*, American Institute of Mining and Metallurgical Engineers, TAMMA, Vol. 227, 1963, p. 1093.