market in the past have constituted a great temptation for several manufacturers to adulterate shellac with cheaper resins.

The natural and inherent factors and the unnatural and avoidable circumstances described above, have frequently disturbed the shellac market in Europe and America and foreign consumers have insisted that shellac and other forms of lac should conform to certain specifications laid down by them. The demands of modern industry are becoming more and more exacting with respect to its natural raw materials. These are expected to satisfy a certain degree of uniformity in its chemical and physical properties as revealed by standardised methods of analysis.

Valuable publications on shellac analysis have been issued by the leading importers and exporters of this commodity in America, England and also in India. In addition there are contributions on this subject from individual research workers and these have been scattered among several scientific journals. As the authors have remarked in their preface, "the various trade interests are still not agreed upon what fundamental and special tests should constitute the analysis of lac and no one method exists for the examination of any particular property."

The Indian Lac Research Institute at Ranchi has for sometime been engaged in this problem of shellac analysis and the Institute has the enviable advantage of being able to obtain genuine samples of every type and every form of lac for research. The Handbook of Shellac Analysis under review, includes a substantial portion of the experimental work and wide experience accumulated during the past twenty years. The authors have rendered a great service to the Indian lac industry by bringing together all the available methods of shellac analysis into one volume and by appraising them critically in the light of their own valuable experience. It is earnestly hoped that the Handbook will receive the wide publicity it deserves and focus attention on the necessity of evolving a uniform and universally acceptable system of analysis for the various grades and forms of shellac.

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**The Effect of Range of Stress on the Fatigue Strength of Metals.** By J. O. Smith. (*Bulletin of the University of Illinois*, 1942, 39, No. 26, February 17.) Price 55 cents.

The important problem of the Effect of Range of Stress on the Fatigue Strength of Metals has been thoroughly studied and investigated by Mr. J. O. Smith of the University of Illinois. As a result of these investigations a new definition has been evolved for the "Endurance Limit" of a metal under fatigue. This has been defined as the maximum alternating stress which may be superimposed on a given steady stress and repeated an indefinitely large number of times without causing a fatigue fracture. The effect of range of stress on the fatigue strength has been studied with respect to a number of metals, both ductile and brittle, for notched and notch-free specimens and for various ranges of stress in which the steady stress was tension and compression. The author, however, assumes that the results obtained from direct axial tension—compression stresses are also applicable to bending merely on account of the difficulties involved in determining the value of the Ranges of Stress in Bending. This fact has yet to be confirmed by experimentation for various ranges of Bending Stresses.

Two sets of diagrams have been evolved. One The Maximum Stress—alternating stress diagram and secondly, the Steady Stress—alternating stress diagram in which the alternating stress is the Endurance Limit for the corresponding steady stress of the range of stresses. These diagrams are the modifications of the Goodman diagram and are called as such. These are very useful in determining the working stresses of metals under various ranges of stresses, and also the area of cross-section of members under those stresses. All the test data have been illustrated by means of these diagrams.

A set of conclusions drawn from all these data and a Bibliography have been added at the end of the report, which are very useful for further work on the subject.

S. K. L. NARAYANA.

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**Eighth Progress Report of the Joint Investigation of Fissures in Railroad Rails.** By H. F. Moore. (*Bulletin of the University of Illinois*, March 1942, 39, No. 28.) Price 15 cents.

This investigation has been carried out by the Engineering Experiment Station of the University of Illinois jointly with the Association of American Railroads and the Rail manufacturers' Technical Committee. The usual Batter and Hardness measurements have been conducted on Rails in Service and a big table of results has been recorded. In this connection Messrs. R. Jensen and N. J. Alleman point out how the end hardening of rails will make the Brinnel Hardness number of the material constant, even after several million tons of traffic. Mr. R. E. Cramer has further studied this subject and finds that rails develop a sort of weeping cracks which can eventually be built up by welding. These may be due to the excessive end hardening of rails above the Brinnel Hardness number 400. These may also be due to slotting of rail ends or notches on the ground end of the rails near the railtread. But these are not substantiated by experimental results.

Finally Mr. Cramer gives a list of proposed recommended practice for control cooling of rails with or without hydrogen ingots. He also gives a number of lists to determine the manner of growth of shatter cracks well illustrated by microscopic photographs. Messrs. Alleman and H. F. Moore deal with a comparison of drop and bend tests on rails, in which they define the "Force of a Blow" and the several methods of determining the same. All of them are illustrated by a number of test results and are very useful for further work on the subject.

S. K. L. NARAYAN.