

between each adjacent pair of curved surfaces, a rolling contact which sweeps out the air ahead of it. The pump above mentioned has an inner diameter of 13 cm., a depth of 4 cm., and consists of three rings which pump in series; the speed of rotation of the shaft was 800 r. per minute; $\frac{1}{4}$ H.P. suffices to operate it.

The effectiveness of this form of pump appears to be due to two things: (1) A very slight travel of the metal parts produces a relatively rapid motion of the crescent-shaped spaces between the rings on the two plates; (2) the contacts, since they occur between curved surfaces of nearly the same radius, are relatively long; hence the viscosity of the air is sufficient to prevent appreciable leakage backwards.

This pump may also be operated as a blower, or, with slight modifications, can be used as a water motor; indeed, since the rings may be made independent of one another, one can drive the pump by supplying water to one ring and obtain vacuum or blast from the other rings.

SECTION OF INDIA RUBBER CHEMISTRY

D. A. Cutler, *chairman*

F. J. Maywald, *secretary*

W. A. DUCCA: *Testing Methods of Rubber Contents in Raw and Vulcanized Rubber.*

The paper deals with modern methods of rubber analysis by nitrosate and tetrabromide methods. Mostly a historical review of the work done along these lines. In accordance with his own experiences the author concludes that the nitrosate method is not suitable for the determination of rubber in either raw or vulcanized samples, but yields apparently satisfactory results for sulfur of vulcanization. Budde's tetrabromide method gives a fair idea of the percentage of actual rubber in samples of raw material, but is not applicable for vulcanized goods. Huebner's method, bromination under water, based on the Weber-Ditmar theory of vulcanization, is very unreliable in its present form. Until now only a way has been opened towards the development of methods to determine rubber directly.

S. P. THACHER: *On Mineral Compounds Used in Rubber.*

VICTOR HANZLIK: *A Few Notes on Rubber Goods Used in Beet Sugar Factories.*

FRANCIS R. PEABODY: *The Treatment of Crude Rubbers.*

DAVID BLOOM: *Does the Acidity of Crude Rubber Resin Indicate Its Botanical Origin?*

Rubber resins obtained by extraction with acetone, carefully dried and redissolved in warm alcohol, were titrated with standard alkali. The acidity of the resin (expressed as the number of cubic centimeters of alkali used) is referred to a standard quantity of the resin (one hundred milligrams) and this ratio is called the "acidity number."

In the course of the analyses of about one hundred and fifty varied samples of washed and unwashed crude rubbers, the acidity numbers of the resins seem to be a constant for all rubbers of the same class, regardless of their age or mechanical treatment.

CHARLES FOX: *Apocynum Rubber.*

CHARLES KNIGHT (chairman): *Report of Committee on Rubber Analysis.*

CHARLES L. PARSONS,
Secretary.

SOCIETIES AND ACADEMIES

THE CHICAGO SECTION OF THE AMERICAN MATHEMATICAL SOCIETY

THE twenty-ninth regular meeting of the Chicago Section of the American Mathematical Society was held at the University of Chicago on Friday and Saturday, December 29-30, 1911, extending through three half-day sessions. The total attendance was fifty-seven, including forty-three members of the society.

Professor L. E. Dickson, chairman of the section, presided at the opening session on Friday morning. Professor E. B. Van Vleck presided at the session on Friday afternoon while Professor Dickson was delivering his address on the "History of the representation of numbers as the sum of squares," and Professor E. J. Townsend presided at the session on Saturday morning.

At the business meeting on Saturday morning the following officers of the section for the year 1912 were elected: Professor D. R. Curtiss, chairman; H. E. Slaught, secretary, and A. L. Underhill, third member of the program committee.

On Friday noon the members lunched together at the Quadrangle Club, and in the evening they dined together at the same place and spent one of the most enjoyable social occasions in the history of the section.

The following papers were read at this meeting:

Professor Arnold Emch: "Involutoric circular transformations as a particular case of the Steinerian transformation and their invariant net of cubics."

Dr. R. E. Root: "Iterated limits in general analysis."

Dr. Arnold Dresden: "Reduction of systems of linear differential equations of any order."

Dr. Louis Ingold: "Displacements in a function space."

Professor L. E. Dickson: "History of the representation of numbers as the sum of squares."

Professor F. R. Moulton: "Relations of families of periodic orbits in the restricted problem of three bodies."

Professor L. E. Dickson: "Note on Waring's theorem."

Professor L. E. Dickson: "Uniqueness of division in Cayley's algebras with eight units."

Professor J. B. Shaw: "On differential invariants."

Professor E. J. Wilczynski: "On some geometric questions connected with the problem of three bodies."

Professor Peter Field: "On Coulomb's laws of friction."

Dr. E. G. Bill: "Analytic curves in non-euclidean space."

Mr. H. F. Vandiver: "Theory of finite algebras."

Dr. Arnold Dresden: "Note on the second variation; Jacobi's equation and Jacobi's theorem in the calculus of variations."

Professor G. A. Miller: "Gauss's lemma and some related group theory."

Professor R. D. Carmichael: "On a class of linear functional equations."

Professor R. D. Carmichael: "On the theory of the gamma function."

Mr. Vandiver's paper was communicated to the society through Professor Dickson. In the absence of the authors, the papers of Mr. Vandiver, Dr. Bill, Professor Miller and Professor Carmichael were read by title.

The next meeting of the Chicago Section will be held at the University of Chicago, on Friday and Saturday, April 5 and 6, 1912.

H. E. SLAUGHT,
Secretary of the Section

THE BOTANICAL SOCIETY OF WASHINGTON

THE 78th regular meeting of the society was held at the Cosmos Club, Tuesday, February 6, 1912, at 8:00 P.M. President W. A. Orton presided. Thirty-seven members were present. Dr. H. W. Wollenweber and W. W. Ashe were elected to membership.

The following papers were read:

Conditions Favorable to Septoria lycopersici Speg.:
J. B. S. NORTON.

The author reported on a series of observations made on the development of *Septoria* under various conditions affecting growth.

The Relation of Soil Acidity to Plant Societies:
A. W. SAMPSON.

Since the day of Unger and Thurmann there has been considerable difference of opinion as to the relationship between soil chemistry and cover. The fact, however, that different soils support different plants is a matter of common observation. The bearing of soil acidity upon this point has been investigated by the author—chiefly in connection with range revegetation studies conducted in the Wallowa Mountains of northeastern Oregon.

The *Leguminosae* are commonly extremely sensitive to acid soils while many ericaceous species are rather closely confined to acid soils. For example, *Trifolium repens* fails in soils requiring for neutralization the relatively small amount, locally, of 5,000 pounds of lime per acre foot, while no species of *Vaccinium* is known that can be grown successfully in neutral or alkaline soils. Again, some genera (*e. g.*, *Populus* and *Rosa*) are apparently indifferent as regards soil preferences. The preeminent forage plant of the Wallowa Mountains, *Festuca viridula*, varies very widely in adaptability to acidity. The soils on which it grows luxuriantly vary in lime requirements from 5,000 to 41,000 pounds per acre foot. The four species of *Poa* and the two species of *Agropyron* occurring locally reach their best development on calcareous and neutral soils.

Notes of Travel in Central America: Professor A. S. HITCHCOCK.

Having visited the Canal Zone as members of the Smithsonian Biological Survey, Mr. Hitchcock and his son made a two months' side trip to Central America. Collections were made in Costa Rica at Port Limon, San José and Puntarenas, in Nicaragua at San Juan del Sur, Corinto, Masaya and Jinotepe, in Honduras at Amapala, in Salvador at La Union, Acajutla, Santa Ana and San Salvador, in Guatemala at Guatemala City, Volcanso Agua and Port Barrios. Mr. Hitchcock presented notes on the various incidents connected with travel in the countries mentioned and reviewed briefly the botanical results of the journey.

W. W. STOCKBERGER,
Corresponding Secretary