a Rowland concave grating with photographic appliances; the work was comparatively rapid and the results highly accurate. Nearly all the metals had been used. The displacement of the lines toward the red as the pressure increased came out very clearly in the lantern slides and the magnitude of the shift was stated to be related to the periodic law.

Mr. N. E. Dorsey discussed 'A Possible Relation connecting Surface Tension, Molecular Weight and Dielectric Constant.' He pointed out that KM^2T/D^2 is of the same order of magnitude for all the liquids for which sufficient data are obtainable, and gave reasons for suspecting that such should be the case. Here K = dielectric constant, T = surface tension, M = molecular weight and D = density.

The president presented informally the unsolved physical problem of the formation of hailstones.

Charles K. Wead,
Secretary.

THE ELISHA MITCHELL SCIENTIFIC SOCIETY OF THE UNIVERSITY OF NORTH CAROLINA.

The 164th meeting was held on Tuesday evening, March 13, at 7:30 o'clock. Dr. F. P. Venable, president of the university, addressed the society on 'The Progress of Chemical Research in the United States.' Dr. Venable gave this address recently in New Orleans before the American Chemical Society as its retiring president.

The 165th meeting was held on Tuesday evening, April 10, at 7:30 o'clock. Professor William Cain, professor of mathematics and a civil engineer, gave the society a most interesting account of 'The Panama Canal.'

The 166th meeting was held on Tuesday evening, May 8, at 7:30 o'clock. The following papers were given:

Mr. N. C. Curtis: 'An Architectural Scheme for the University Buildings.'

Professor C. H. Herty: 'Recent Work in Osmosis.'

A. S. Wheeler,
Recording Secretary.

THE MISSOURI SOCIETY OF TEACHERS OF MATHEMATICS AND SCIENCE.

The second annual meeting of the Missouri Society of Teachers of Mathematics was held in Columbia, Mo., May 5, 1906. This society was organized a little over a year ago exclusively for teachers of mathematics. In response to the request of many teachers of science steps were taken which resulted in the adoption at the last meeting of amendments to the constitution, enlarging the scope of the society so as to include teachers of science, and providing for meetings of a division of mathematics and a division of science in addition to joint meetings. Provision was made to send delegates to cooperate in the completion of the organization of a national society. A committee was appointed to cooperate with committees from similar societies to discuss matters relating to instruction in elementary physics.

The program of the day consisted of a business meeting and a forenoon and afternoon meeting of each of the two divisions. Mr. H. C. Harvey, of Kirksville, presided at the business meeting and at the division of mathematics. Mr. F. N. Peters presided at the division of science. Mr. J. W. Withers was elected president for the coming year. In addition to individual papers in each division, a round-table discussion of the teaching of elementary algebra was held which was participated in also by a number of teachers of physics. On the whole, a very encouraging interest was manifested in the work of the society.

A complete program and abstracts of the papers presented will be published in *School Science and Mathematics,* the official organ of the society.

L. D. Ames,
Secretary.

DISCUSSION AND CORRESPONDENCE.

A PLEA TO MAKE THE SMITHSONIAN INSTITUTION A NATIONAL INSTITUTE OF RESEARCH.

There is great need in this country to-day of a place where advanced investigators can go, as they can to the great German universities, and carry out researches in an atmosphere of investigation, such as is only created by the friction of young and vigorous but trained intellects.

In our universities the pedagogic element is

predominant to a degree quite unknown in the German university and the body of investigators in them in any one field is too small to create that which is the most stimulating thing in all research—an atmosphere of investigation.

I venture to say that there is not a single American investigator who has occupied one of the tables of the Smithsonian Institution at Naples (in that wonderful research laboratory of the Biological Station) who will not bear me out when I state that the stimulus of research of that institution comes from the contact that is there encouraged between the investigators of all Europe.

Any institution composed only of a number of men with fixed salaries will gradually become conservative and cease to be productive of great results. It is the young men with the spur of ambition and necessity that create new things in science.

Why not recognize this great factor and do for science what West Point has done for the army? Let the Smithsonian Institution start the movement and get together from the various states a hundred picked men who do not want to be taught but each one of whom has an idea of his own that he is anxious to work out in an atmosphere that is stimulating to research, and where he can be in close touch with other minds that are interested in similar lines of work or at least are broad enough to grasp the importance of the problem that he is absorbed in.

Spend all the money necessary in the selection of these men. Organize the machinery by which this selection is done and, if it is advisable, apportion them out among the different states and make the senators responsible for those from their states. Have each applicant present a definite problem to be solved and in addition, by references and examination, if necessary, show his fitness to hold a table in the institution. In addition, appoint a committee that shall make a study of each applicant proposed for admission and let their decision as to the man's fitness for the place be final. Give this committee every facility to study the problem of selecting men who have the sacred fire of the investigator in them.

Have each table fully equipped with all the necessary apparatus and give to each state investigator a sum of money each year that he can live on comfortably.

Fix the terms of occupancy of the tables at two years, but give to the board of directors the right to retain for two years longer such men as in their estimation have shown marked ability or whose researches are of sufficient promise though not completed to warrant a longer stay.

Get men of prominence in the various lines of research as permanent investigators, with the understanding that they are not to be teachers but will be given the means with which to carry on their investigations, at the same time imposing on them the work of keeping up the spirit of the institution, and assisting in the details of its administration by means of board meetings just as colleges are managed.

Divorce from the Smithsonian Institution the museum idea. Create a separate office to have charge of the collections and the expositions of applied science and put in this office a man whose tastes are those of an administrator.

Once separate, the Smithsonian Institution proper should become the great national institute of research and to be at its head should be a compliment not only to scientific accomplishment but to one's devotion to the great spirit of discovery.

The man for the head of an institution of research such as I have described would be one preeminent in his line of work but in addition, like the great Ostwald, of Leipzig, a believer in the great value of free laboratory discussion.

DAVID FAIRCHILD.
U. S. DEPARTMENT OF AGRICULTURE.

SPECIAL ARTICLES.

A MACHINE FOR COMPOUNDING SINE CURVES.[1]

THE instrument about to be described was designed primarily for use in a class in alternating currents. It has proved itself well

[1] Presented before the American Physical Society, February 24, 1906.