TREASURER'S REPORT FOR THE YEAR 1905.

RECEIPTS.

Balance from 1904.....	\$1,625.12	
Interest on balance.....	56.88	
Arrears of dues	15.00	
Life membership fees, three.....	150.00	
Initiation fees, twenty	60.00	
Refund on Nomenclature Committee.....	17.60	
Annual dues for 1905	1,295.00	\$3,219.60

DISBURSEMENTS.

Physical Review, 247.....	\$ 741.00	
Science abstracts, 284.....	426.00	
Andrus and Church, Printing, etc.....	128.00	
Office of Secretary	142.40	
Office of Treasurer.....	21.40	
Drafts and collections	3.50	
Incidental printing.....	14.47	\$1,477.07
Balance carried to 1906.....		1,742.53
		\$3,219.60
Total annual outlay.....		\$1,477.07
Interest on fund.....	\$ 56.88	
Annual dues.....	1,295.00	
	1,351.88	
APPARENT DEFICIT.....	125.19	1,477.07

THERMOELECTRIC HETEROGENEITY IN CERTAIN ALLOYS,
ESPECIALLY GERMAN-SILVER.¹

BY EDWIN H. HALL, L. L. CAMPBELL AND S. B. SERVISS.

IN calibrating thermo-electric couples made of annealed german-silver with copper for the temperature region 100° to 218° , using a temperature interval not far from 40° , the authors found the electromotive force, in the case of some couples, to vary as much as two or three per cent. of itself when the junction which had been the hotter became the colder and *vice versa*. The german-silver wires were about 0.02 cm. in diameter and about 150 cm. long. A part some 45 cm. long near the middle of each german-silver wire was, in these experiments, outside the heating vessels, and at first no care was taken to keep this part warm, so that steep gradients of temperature existed in the german-silver wire just outside the entrance to each vessel. It was at first thought that local peculiarities of this wire due to accidental bending or stretching after the an-

¹ Abstract of a paper presented at the meeting of the Physical Society held on Dec. 29-30, 1905.

nealing might, if these peculiarities happened to come at places where the temperature gradient was steep, cause the changes observed on reversal of the temperature interval of the junctions. Experiment seemed to show, however, that these peculiarities could not reasonably be made to account for all of the difference of electromotive force observed on this reversal.

Further experiments, made by touching with the sharp edge of a lump of ice various points 1 cm. apart on long straight pieces of german-silver wire exposed to air at a temperature of 18° or 20° centigrade, gave perceptible electromotive forces, some of which were in one direction and some in the other direction, about twenty changes of sign occurring in a distance of 50 cm. along the wire. Annealing a wire, by heating to incandescence for a few seconds in air, was found to increase its thermo-electric heterogeneity. Permanent stretching of a wire 10 per cent. left the local thermo-electric peculiarities almost unchanged in magnitude and in distribution. Reannealing a wire after such a stretching again increased these local peculiarities and changed their distribution. The greatest electromotive force observed on touching a german-silver wire with ice was about $\frac{1}{500}$ part of that which would have been produced by touching a junction of copper and german-silver. The heterogeneity thus found in straight recently annealed wire is great enough to be a possible source of serious error in cases where a copper-german-silver couple is used to measure a small difference between two temperatures much above the temperature of the room, if the middle part of the german-silver wire is freely exposed to the air. In later calibration experiments the difference of electromotive force found on reversal of the temperature interval of the junctions was greatly diminished by protecting the middle parts of the german-silver wires with asbestos fiber, so that, being near the heating vessels, they were raised to a temperature not far below that of the cooler vessel.

A manganin wire, tested by touching at various points with ice, behaved very much as german-silver wire did. A constantin wire showed local differences, but these were much less than in german-silver or in manganin.

THE OPTICAL PROPERTIES OF CARBON.¹

BY HERBERT A. CLARK.

AN anomaly in the dispersion and in the absorbing and radiating powers of carbon has been found by Wood and E. L. Nichols. In view of this fact, it has seemed worth while to obtain data regarding the reflection as well as the absorption and dispersion, all from the same specimen, of carbon deposited in various ways.

¹ Abstract of a paper presented at the meeting of the Physical Society held on Dec. 29-30, 1905.