

The Scientific Shop

ALBERT B. PORTER

Scientific Instruments

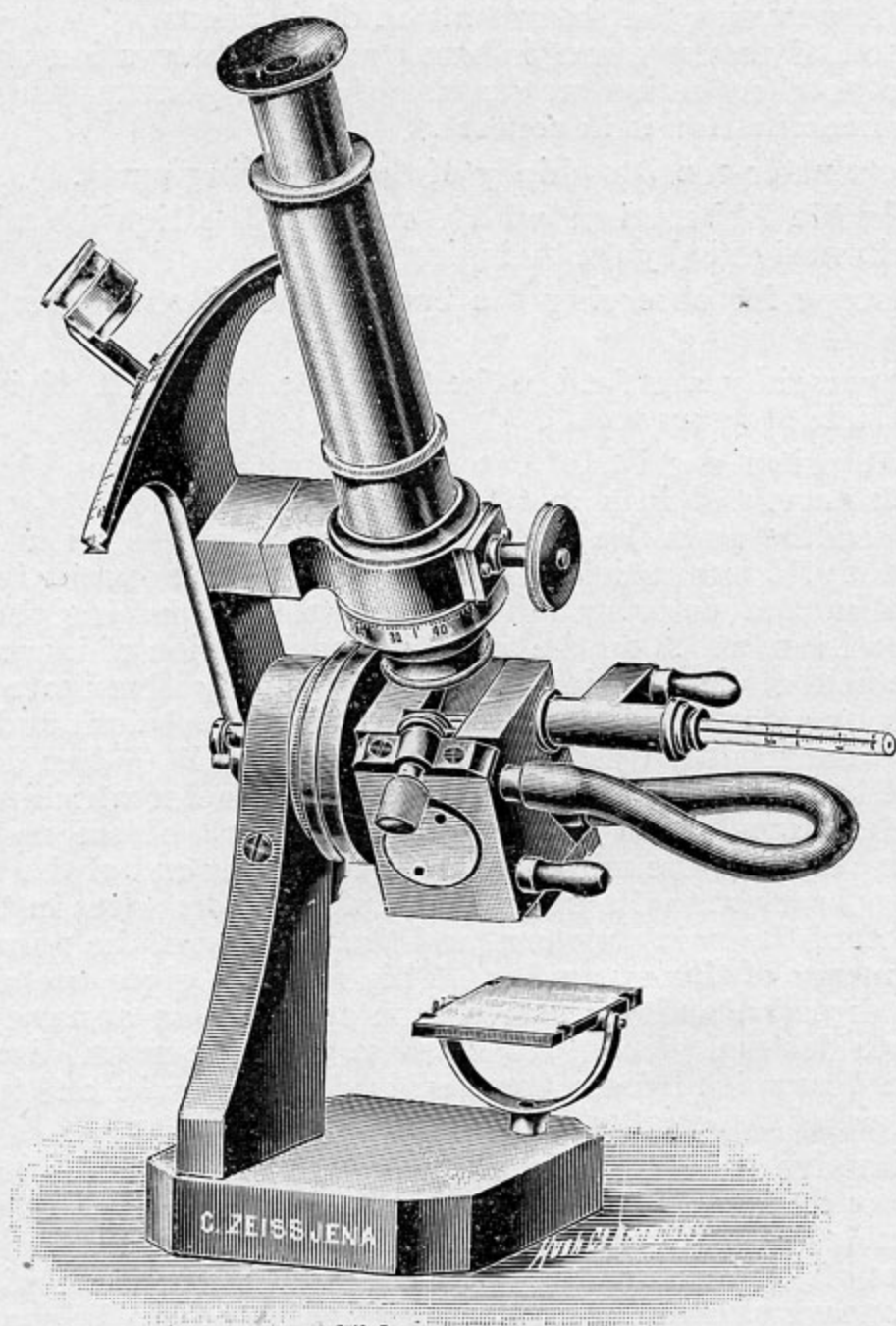
324 Dearborn St., CHICAGO

CIRCULAR 346

JULY 1906

Refractometers

Note: Prices are given below both duty free and duty paid. The former apply only to instruments especially imported on the order of, and for the use of, educational institutions which are entitled under the tariff law to enter scientific instruments free of customs duty.



C 935

Because of their rapidity and reliability, refractometric methods of investigation are being rapidly developed and more extensively used in technical laboratories and in institutions concerned with the analysis of food-stuffs. This is shown by the increasing mass of literature* relating to details of the new method, and by the greater space now allotted to refractometry in technical books. Thus Leach's "Food Inspection and Analysis" (New York: John Wiley & Sons, 1905), a work unequalled in the English tongue, devotes 36 pages to refractometry, including 13

* Cf. Bibliography of Refractometrical Literature recently published by Carl Zeiss, and sent post free on request.

pages of tabulated results. These tables, as well as Leach's "Comparative Refractometer Scale," reduce the required amount of computation to a minimum, and should be a boon to the technical chemist who is often overwhelmed with work involving calculations. Every user of a refractometer is strongly advised to make a close study of Leach's work.

Abbe Refractometers

The Abbe Refractometers are designed for measurements of the refractive indices and mean dispersions of liquid and solid bodies. Because of their extraordinarily simple manipulation (the refractive index being read off directly on a graduated circle after a single movement requiring no particular skill) and their wide range of measurement, embracing refractive indices from 1.3 to 1.7, they have been found to answer all practical requirements in physical, chemical, and technical laboratories, for distinguishing various substances, testing their purity, and for rapidly determining the concentration of solutions.

The method of measurement is based on the observation of the position of the border line of total reflection on the face of a flint glass prism with which the substance under examination is in contact.

The refractometer consists chiefly of the following parts.

1. The double Abbe prism which contains the liquid and which can be rotated on a horizontal axis by the swinging arm.
2. A telescope for observing the border line of total reflection on the face of the prism.
3. A sector rigidly attached to the telescope, on which divisions representing refractive indices are engraved.

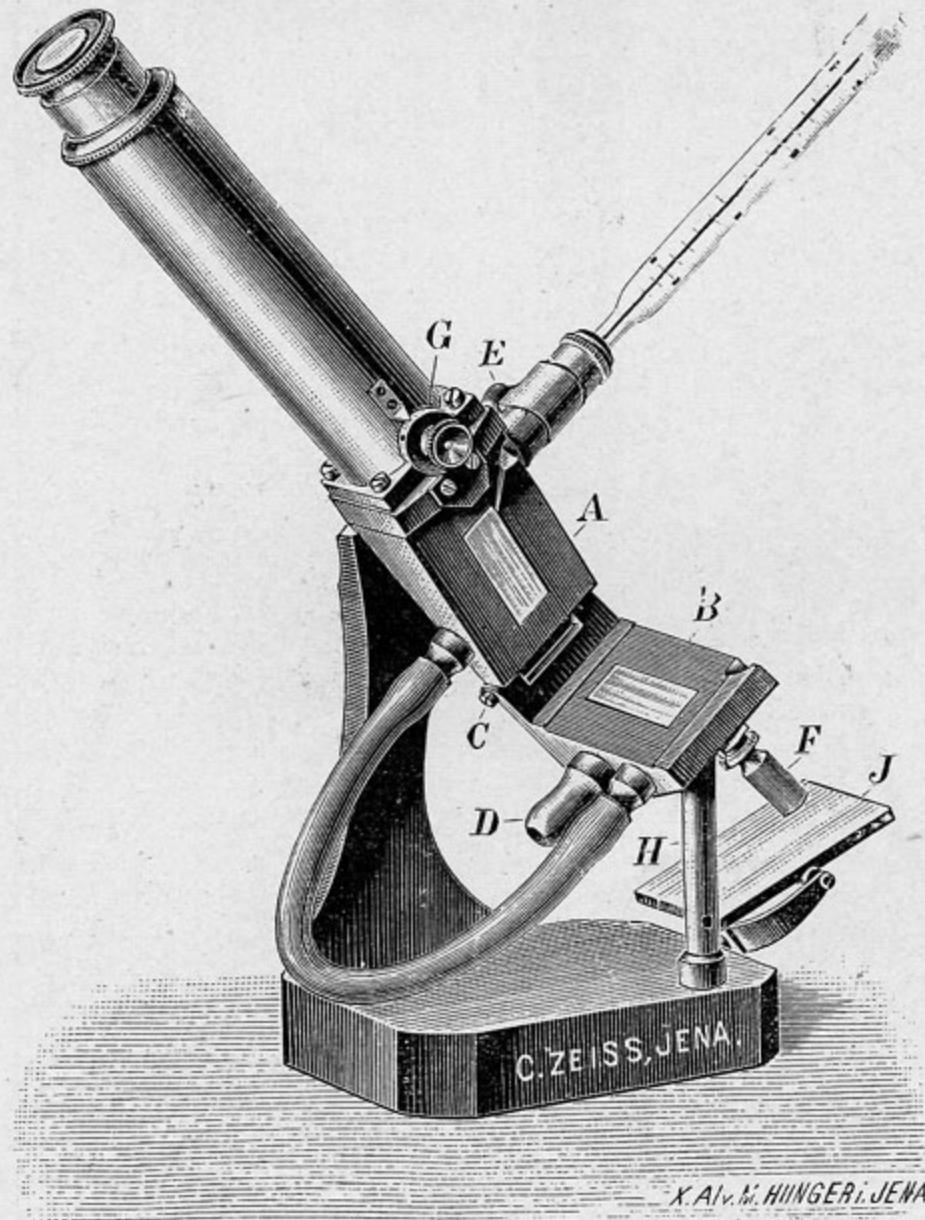
The double prism consists of two similar prisms of flint glass of refractive index 1.75, each cemented in a metal mount. A few drops of the liquid to be examined are placed between the adjacent inner faces of the prism, thus forming a thin stratum about 0.15 mm. thick. The border line is brought into view in the telescope by holding the sector stationary while slowly moving the swinging arm from its initial position, at 1.3 on the scale, in the direction of increasing refractive indices until the field of view, which is originally wholly illuminated, is encroached upon from below by a dark shadow; the line dividing the bright and dark halves of the field is then what has been called the "border line." When daylight or lamp light is used, the border line first appears as a band of color which must be reduced to a sharp colorless line by aid of the "Compensator" before making a reading. This is effected by turning the milled head at the lower end of the telescope. The border line is now brought to the intersection of the cross-wires in the field of view by a slight motion of the swinging arm, and the position of the pointer on the scale is then read by means of the magnifier. This reading gives the refractive index (for the D line) directly, and without computation, to an accuracy of about two units in the fourth decimal place. At the same time the mean dispersion between C and F can be determined from the reading of the scale on the drum of the compensator by aid of a special table and a short calculation.

As the refractive indices of liquids vary rapidly with the temperature it is important to know and to be able to control the temperature of the liquid contained in the double prism during the measurement; on the other hand ordinary in-door variations of temperature are of no consequence in work with solid bodies. Where precise measurements of indices of liquids are to be made, it is hence essential to be able to bring the double prism to a definite known temperature which may be kept constant within a few tenths of a degree for several hours; this condition can be readily secured by means of the heating attachment used in connection with the spiral heater and water-pressure regulator.

	Duty Free	Duty Paid
C 935 Abbe-Zeiss Refractometer with heating attachment, in case with lock and key, directions for use, and dispersion and conversion tables.....	\$85.00	\$122.00
C 936 Thermometer for same, 0° to 50°C in ½°, with screw fitting.....	1.15	1.60

		Duty Free	Duty Paid
C 937	Wollny's Special Thermometer for butter and lard, with screw fitting.....	\$ 1.75	\$ 2.50
C 938	Baier's Special Thermometer for Summer and Winter butters, with Wollny's scale for lard, with screw fitting.....	2.25	3.25
C 939	Correction Thermometer for milk fat, with screw fitting.....	1.75	2.50
C 940	Spiral Heater with Water-Pressure Regulator	17.50	25.00
C 941	Abbe-Zeiss Refractometer without heating attachment, in case with lock and key, and with directions for use.....	76.00	109.00

Butter Refractometer

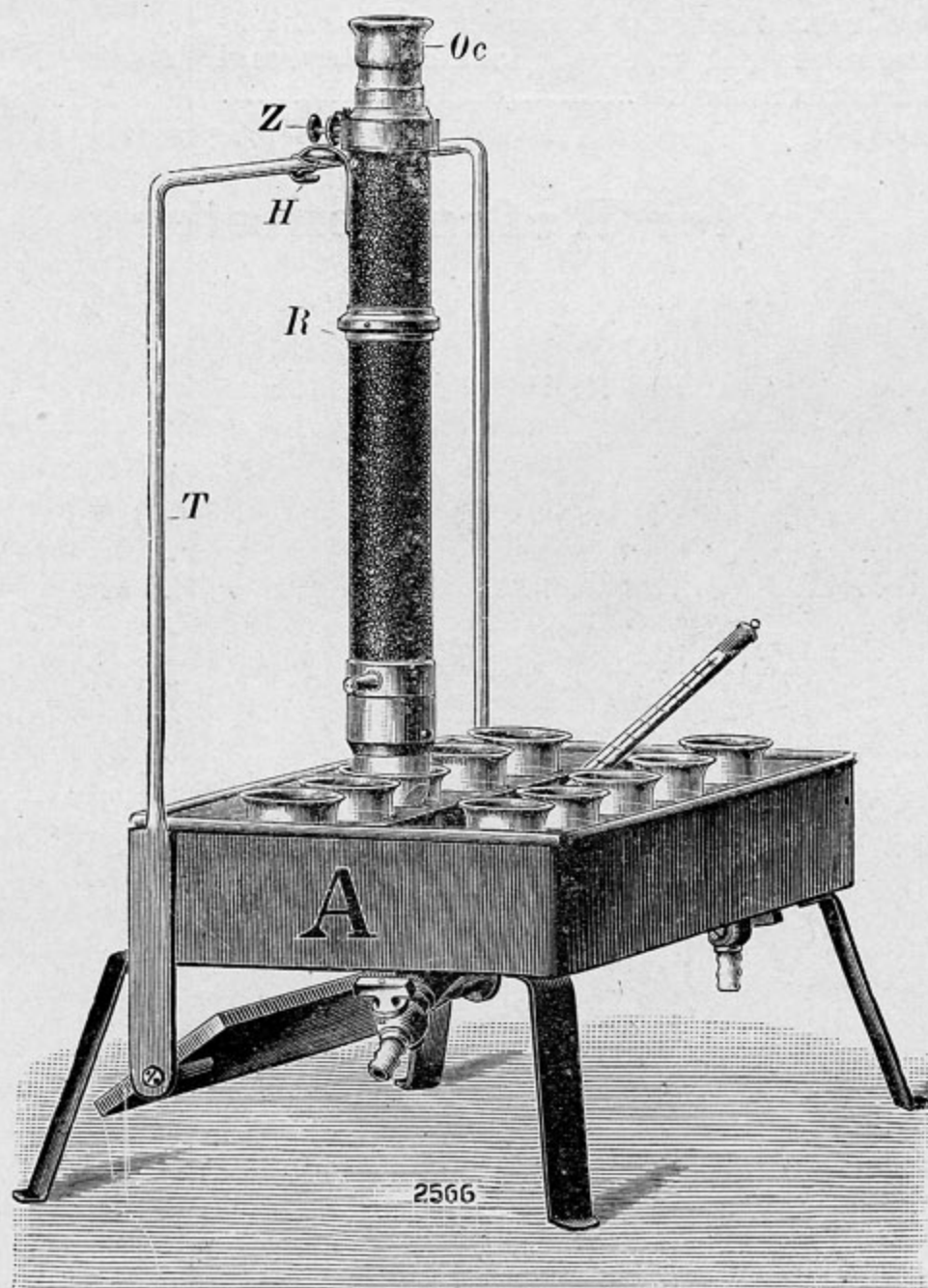


C 942

		Duty Free	Duty Paid
C 942	Wollny-Zeiss Butter Refractometer for examination of butter, detection of oleomargarine, examination of fats and oils, determination (to $\frac{1}{3}$ per cent) of water in glycerine, etc. The range of the scale is from 1.42 to 1.49. Complete in case with directions.	\$48.00	\$70.00
C 936	Thermometer , 0° to 50°C. in $\frac{1}{2}^{\circ}$, with screw fitting	1.15	1.60

		Duty Free	Duty Paid
C 937	Wollny's Special Thermometer for butter and lard.....	\$ 1.75	\$ 2.50
C 938	Baier's Special Thermometer for butter and lard.....	2.25	3.25
C 940	Spiral Heater and Water-Pressure Regulator	17.50	25.00

"Dipping" or Immersion Refractometer

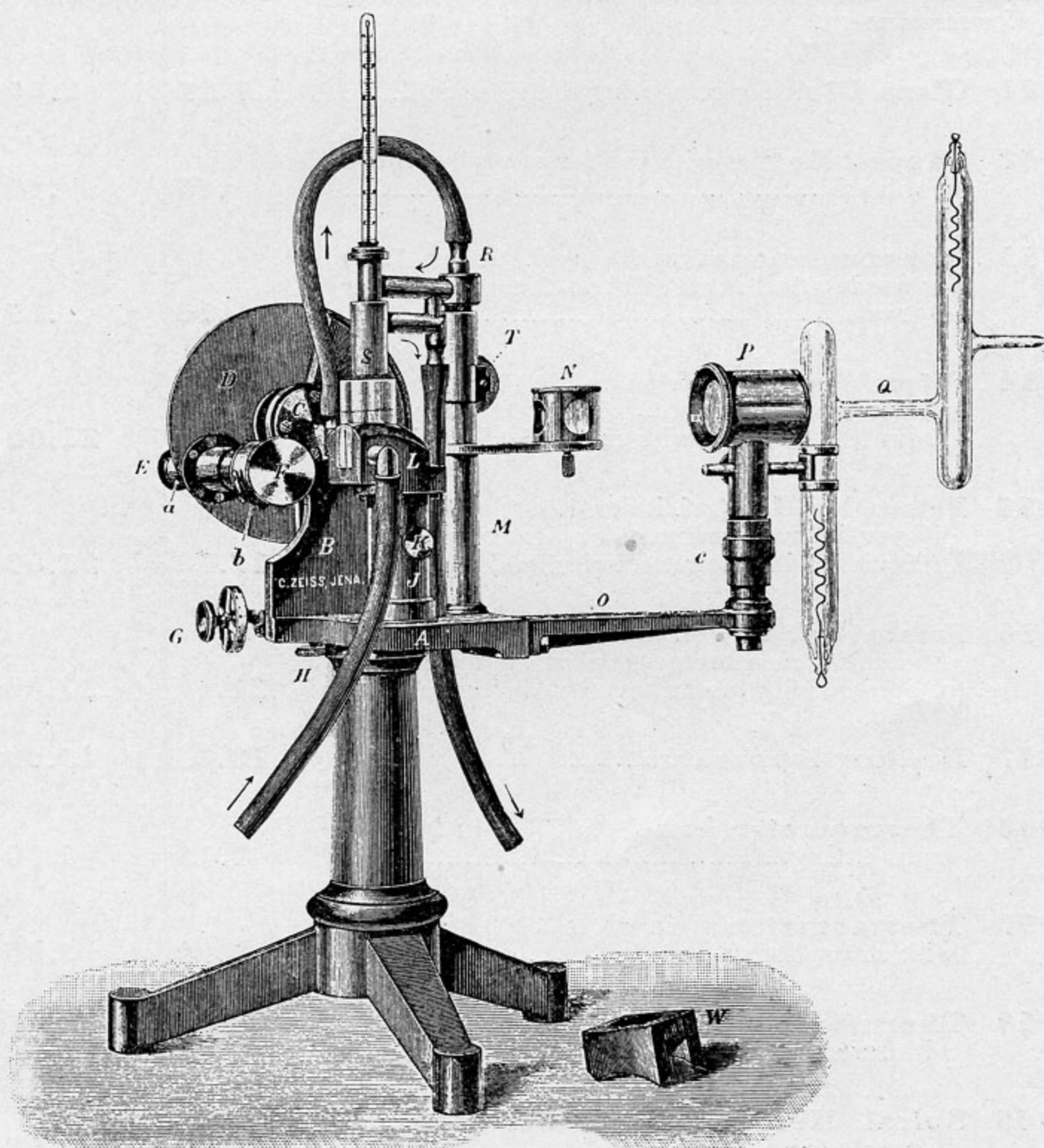


C 943 and C 944

		Duty Free	Duty Paid
C 943	Zeiss Immersion Refractometer for examination of liquids of low refractive index such as milk, aqueous, alcoholic and ethereal solutions, etc. The range of the instrument is from 1.325 to 1.366. The prism is so mounted that nothing but glass comes in contact with the liquid.....	\$58.50	\$83.50
C 944	Vessel A for use with same, holding 10 beakers; for quick examination of a number of liquids at the same time; with window in the bottom of the vessel and reflecting mirror; complete with 10 beakers.....	6.50	9.50

	Duty Free	Duty Paid
C 945 Auxiliary Prism for examination of very small quantities of liquids.....	\$ 2.75	\$ 4.00
C 946 Thermometer from 0° to 50°C in 1-10°, in nickelled tube	6.00	9.00
C 940 Spiral Heater and Water-Pressure Regulator	17.50	25.00

Pulfrich's New Universal Refractometer



C 947

	Duty Free	Duty Paid
C 947 Pulfrich's New Universal Refractometer for determining the refractive indices and dispersions of solids and liquids, in case with one Geissler H-tube, but without prism or heating attachment	\$115.00	\$164.00
C 948 Geissler H-Tube	2.25	3.25

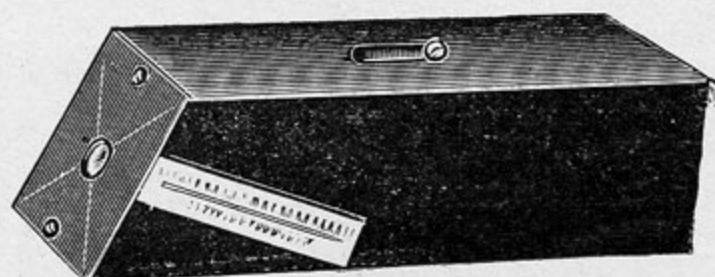
	Duty Free	Duty Paid
C 949 Prism No. I (ref. index 1.62), primarily intended for examination of liquids of refractive indices between 1.33 and 1.61, including mount, carrier, and glass cell.....	\$12.00	\$17.50
C 950 Prism No. II (ref. index 1.75), primarily intended for examination of solids (glasses, etc.) having refractive indices between 1.47 and 1.74, with mount and carrier.....	14.00	20.50
If prism No. II is to be used only for the examination of liquids it can be ordered with the glass cell cemented on; otherwise the cell will be sent loose, ready for attachment.		
C 951 Glass Dish for cementing the glass cell.....	1.35	2.00
C 952 Capped Bottle with rod for applying drops of a liquid.....	.80	.40
C 953 Monobromonaphthalin (ref. index 1.65) for use in attaching a solid to the prism. Per 10 grams.....	.15	.25
C 954 Prism No. III (ref. index 1.89) for use with substances of exceptionally high refractive index (from 1.64 to 1.88), with mount and carrier.....	14.75	21.00
C 955 Prism No. IV (ref. index 1.62) arranged for differential measurements of refractive indices of liquids, with mount, carrier, and cover.....	17.50	25.00
C 956 Prism No. V (ref. index 1.75) arranged for differential measurements of refractive indices of liquids, with mount, carrier, and cover.....	21.50	31.00
C 957 Heating Apparatus	13.25	19.00
C 958 Thermometer from 0° to 75°C. in 1°, with screw fitting.....	1.15	1.50
C 959 Thermometer from 0° to 50°C. in 1-10°, with screw fitting.....	5.00	7.25
C 960 Thermometer from 50° to 100°C. in 1-10°, with screw fitting.....	6.25	9.00
C 940 Spiral Heater and Water-Pressure Regulator	17.50	25.00
C 961 Reed's Sodium Burner	4.50	6.50

Note. In case the foregoing refractometers are to be used in a laboratory not supplied with running water, some means of securing circulation of water in the spiral heater is necessary. For this purpose we recommend:

C 962 Hot Air Motor and Pump	12.50	17.50
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Ives' Simplex Spectroscope

A small diffraction spectroscope of original design and construction.



Cheaper and much more efficient than the commonly used prismatic pocket spectroscopes.

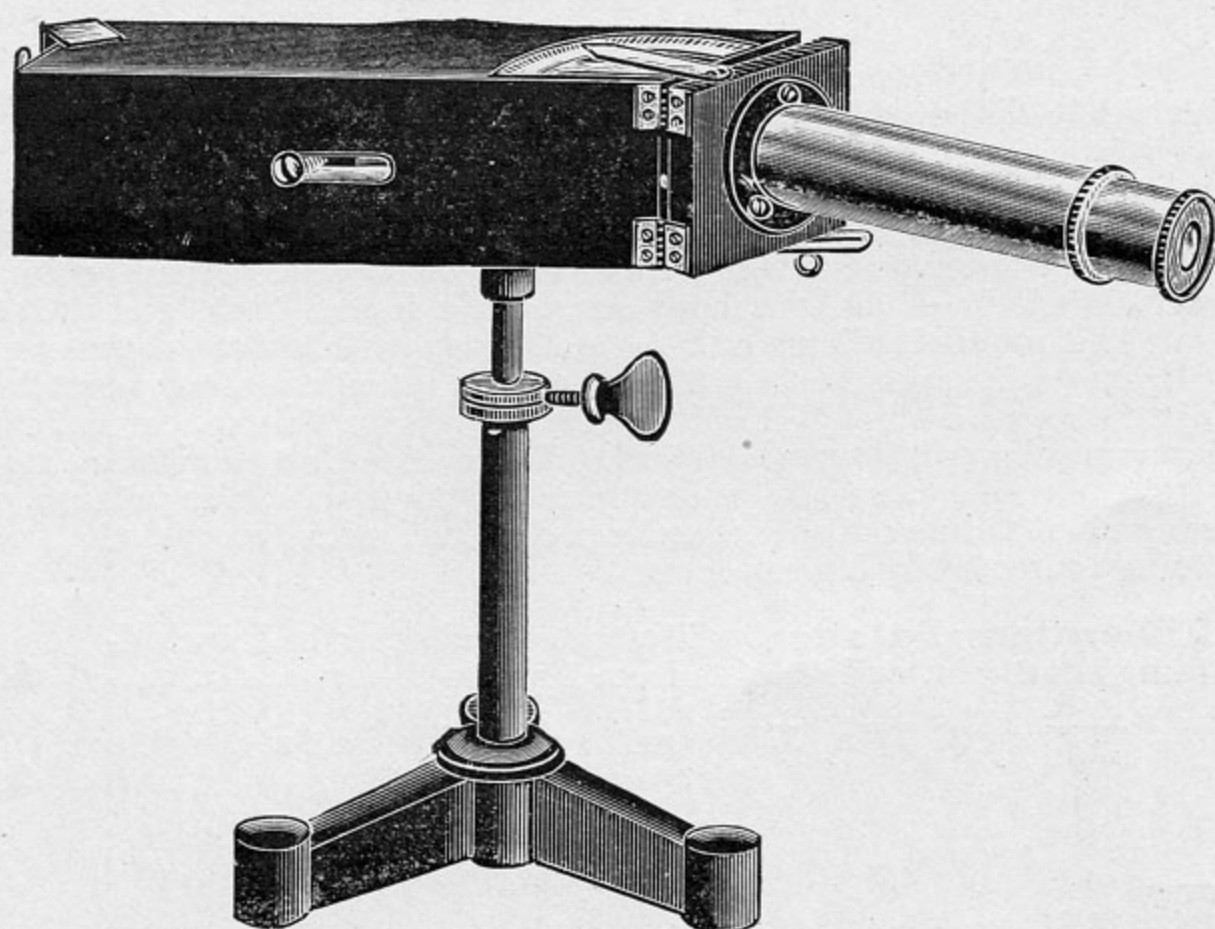
C 133

The Simplex Spectroscope measures 2x2x8 inches, and weighs eight ounces. It has a sliding focus, an adjustable slit, and is fitted with a small Ives replica of a Rowland diffraction grating. With the slit closed sufficiently to show the D, E, b, and F Fraunhofer lines, it gives a brilliant first order spectrum in diffused daylight, while in direct sunlight, with narrow slit, the D line is resolved and is distinctly seen as a double line in the spectrum of the second order.

The Simplex Spectroscope is especially useful in the chemical laboratory, where it serves for recognition of the alkali metals by the flame test, observation of the absorption spectra of solutions, etc.

C 133 Ives' Simplex Spectroscope..... \$5.00

Ives' Duplex Spectroscope No. 1



C 135

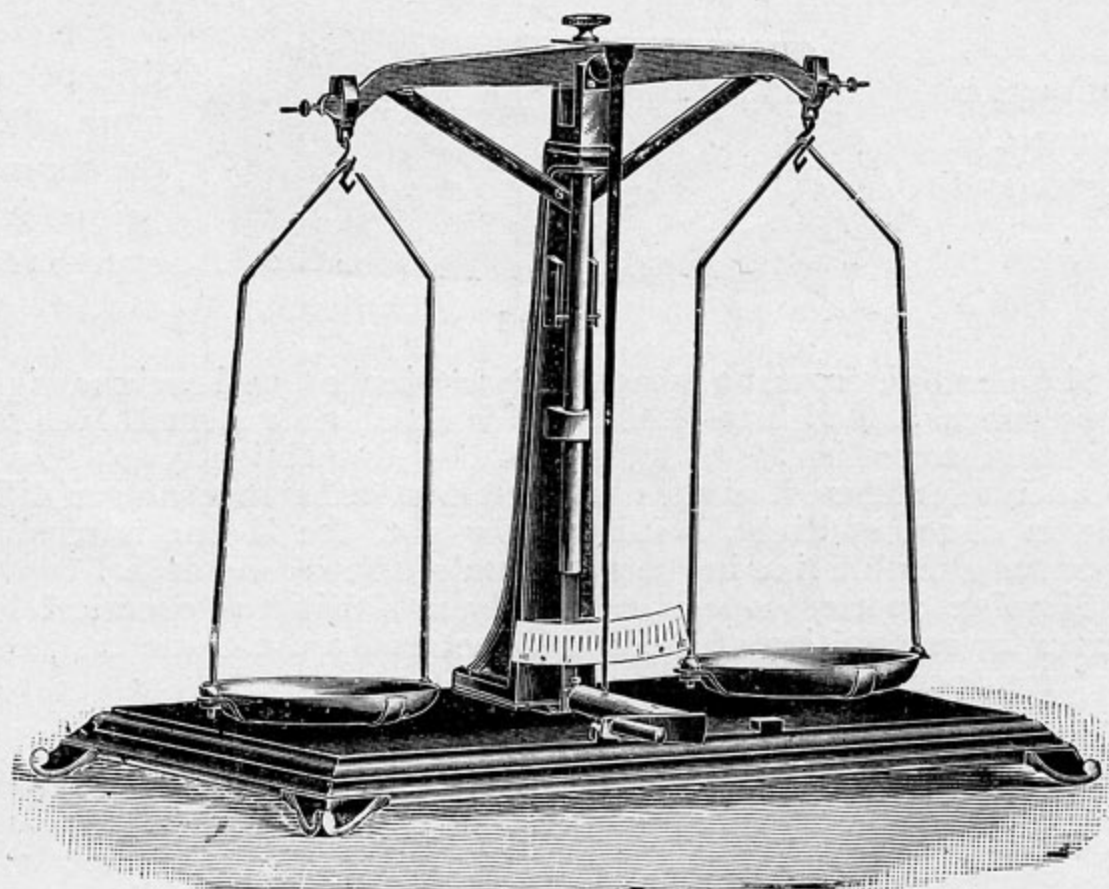
This is essentially a Simplex Spectroscope with the addition of a stand, a telescope, and an adjustable mirror for the comparison of spectra.

The first order spectrum is shown all at once across the large field of a 2 inch Huygenian eyepiece, and with narrow slit and direct sunshine the D line is handsomely resolved. With a higher eyepiece, the second order spectrum can be made to show the nickel line. The Duplex Spectroscope is hence more efficient for many purposes than an instrument of the Bunsen pattern costing two or three times as much. Its low price is due to the fact that the body is of wood instead of metal, a construction which secures a high degree of efficiency and durability at low cost.

C 135 Ives' Duplex Spectroscope No. 1..... \$15.00

Send for Circular 325, which contains descriptions and prices of other diffraction spectroscopes

New Laboratory Balance C 74



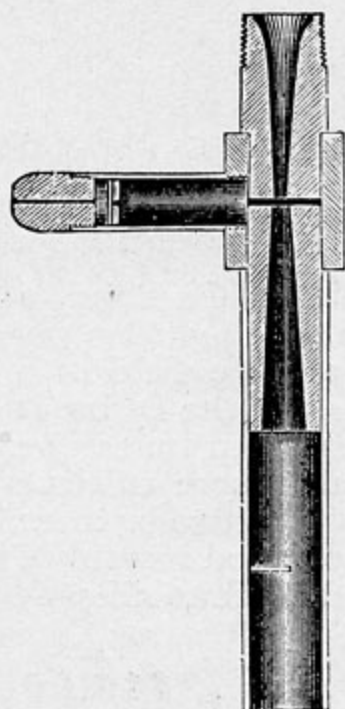
C 74

This newly designed balance is intended for use either in the laboratory or the lecture room. It is well and substantially made, on the "Dutch System", with prismatic end knife edges and movable pans. The base and pillar are made of japanned iron, the beam, bows, and pans being of brass, neatly lacquered or nickel plated. There is a lever arrestment for beam and pans. The beam is twelve inches long between the knife edges, the bows are twelve inches high, and the pans are five and one-half inches in diameter. An extra pan with short suspension is provided for hydrostatic experiments. The balance is intended to carry one thousand grammes in each pan, although it will safely carry twice this much, and indicates ten milligrammes by a full scale division at full load. A set of nickel plated brass weights from ten mg. to one kilogramme is supplied with the balance. These weights are mounted in a polished beechwood block, with forceps, the fractional weights being protected by a glass cover.

C 74 Laboratory Balance as illustrated and described, including short pan, and weights from 1 kg. to 10 mg. **\$20.00**

C 74a Laboratory Balance only, without short pan and weights..... **\$14.00**

Delivery from stock.



C 438

Chapman Filter Pumps

C 438 Chapman Filter Pump, of brass, new model, very efficient, regular size.
From stock..... **\$1.00**

C 439 Same, larger size. From stock..... **2.00**

C 440 Faucet Connections for above.
Each, from stock..... **.25**