

CATALOG F

No. 123

PHYSICAL APPARATUS
AND
INSTRUMENTS

INCLUDING SECTIONS ON
RELATED

TOOLS, RAW MATERIALS AND
CHEMICAL APPARATUS



Established
1889

A. H. McCONNELL, President
H. C. ARMS, Vice-President
J. M. ROBERTS, Secretary

Incorporated
1900



MANUFACTURED AND SOLD BY

CENTRAL SCIENTIFIC COMPANY

460 East Ohio Street

(Lake Shore Drive, Ohio and Ontario Streets)

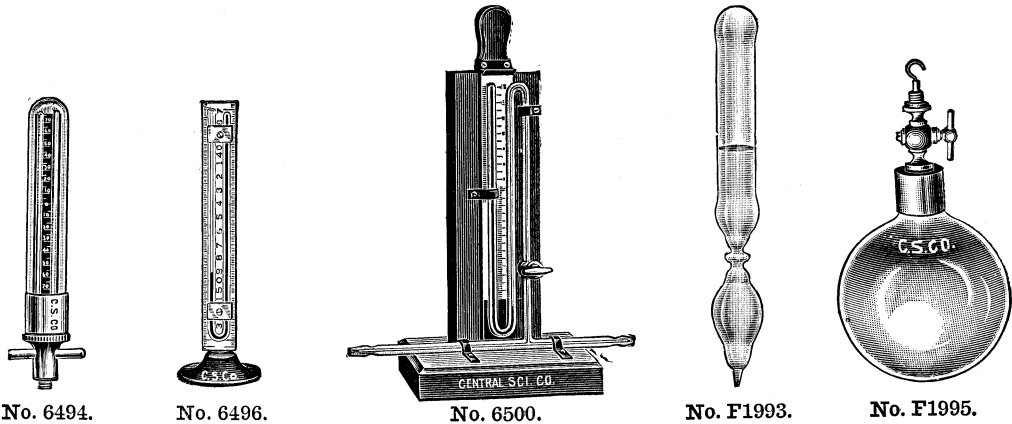
CHICAGO

U. S. A.

Central Scientific Company of Canada, Limited

NEW YORK

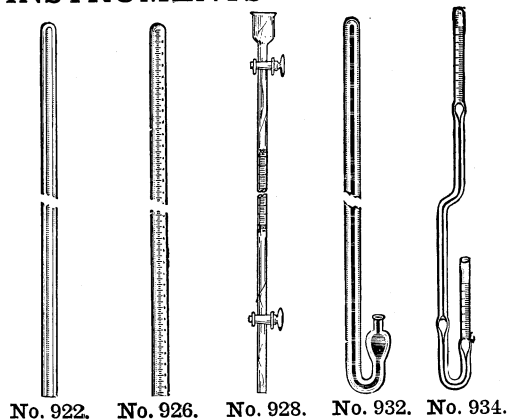
TORONTO

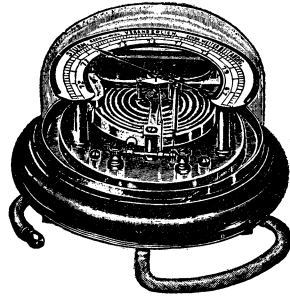


- No. 6494. **VACUUM GAGE** or **MANOMETER**, for use with air pumps which are provided with a $\frac{1}{16}$ -inch opening tapped with 16 threads to the inch. Enclosed in glass tube with oxidized scale 14 cm long, graduated in millimeters. Filled with mercury, ready to attach to pump..... \$10.00
- No. 6496. **VACUUM GAGE** or **MANOMETER**. To be used under any bell jar which is 8 inches or more high. Tube is mounted on a base with millimeter scale. Filled with mercury, ready for use. 2.50
- VACUUM GAGE** or **MANOMETER**, of glass, with stop-cock and movable mirror scale graduated in millimeters for 13 cm above and below the zero line. Mounted on a wood support.
6499. Without mercury 10.00
6500. Filled, ready for use..... 15.00
- For other **VACUUM GAGES**, see page 139.
11028. **VACUUM WAX**. The best preparation on the market for using on apparatus in connection with the Air Pump, especially where high vacua are desired. Will not injure the pump plate or apparatus. Will not harden and can therefore be easily removed. Superior to vaseline, tallow or heavy oil.....Per 4 oz. jar .30
- F1991. **WASHERS**, as used on stop-cocks and other air pump accessories. Outside diameter, $\frac{11}{16}$ -in.; hole, $\frac{1}{16}$ -in.Per dozen .15
- F1993. **WATER HAMMER**, all glass, one bulb, length 25 centimeters. Illustrating that water enclosed in vacuum falls as if solid, and on striking the bottom of the glass tube, emits a click as if glass was struck with a solid substance..... 1.20
- F1995. **WEIGHT OF AIR GLOBE**, of polished brass 10 cm in diameter, with stop-cock and removable hook 2.75
- For experiments employing No. F1995 or similar apparatus, see A. & B. p. 206; A. H. & B. Exp. 18; B. Exp. 14; F. & B. Exp. 15; H. Exp. 18; M. G. & B. Exp. 9A; Pac. Exp. 15.*

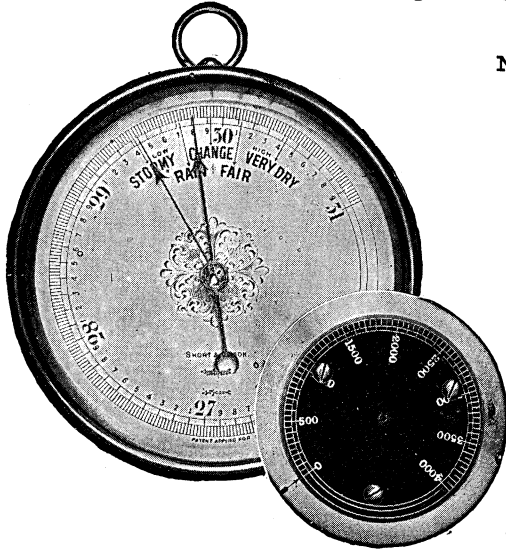
METEOROLOGICAL INSTRUMENTS

922. **BAROMETER TUBE**, unfilled, large bore, thick wall, one end sealed. Length, 80 cm..... .50
924. **BAROMETER TUBE**, unfilled, same as No. 922, with glass mercury well and pipette for filling..... .70
926. **BAROMETER TUBE**, unfilled, same as No. 922, but graduated in millimeters 2.00
928. **BAROMETER TUBE, Demonstration Form**, unfilled, with funnel top and with stop-cock at top and bottom for easy filling and emptying of the tube. Total length, 104 cm. Graduated from 100 to 780 mm in millimeter divisions 6.00
930. **Mercury Well**, for use with Barometer Tubes Nos. 922-928, of japanned iron. Capacity about 50 cc..... .55
932. **BAROMETER TUBE, Siphon Type**, unfilled, with bulb on short arm. Length, 80 cm... .60
934. **BAROMETER TUBE, Siphon Type, Bunsen's**, unfilled. Graduated at the top of each arm in millimeter divisions 4.00
7200. **BAROMETER TUBING**, heavy wall, outside diameter from 6 to 10 mm. In 3 foot lengths.
- | | | | |
|---------------------------|-----|-----|-----|
| Diameter of bore, mm..... | 3 | 4 | 5 |
| Per lb. | .85 | .85 | .85 |

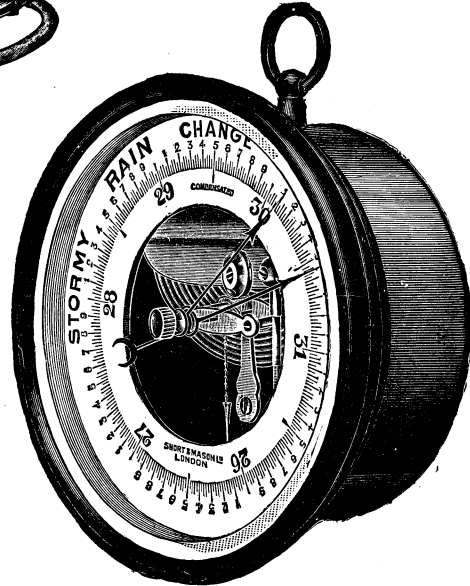




No. 872.



No. 876.



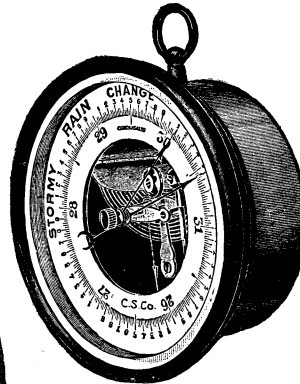
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BAROMETERS

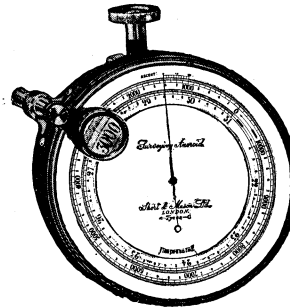
- 872. **BAROMETER, Aneroid, Demonstration Form, English and Metric Scales**, a very useful instrument which should be in every laboratory in which the principle of the barometer is taught. By simply blowing in or drawing out the air by means of a rubber tube the effect of the atmospheric pressure upon a barometer is clearly demonstrated. This barometer is handsomely mounted and finished and makes a very accurate instrument for daily barometric observations. Graduated from 28 to 31 inches by 0.05 inch divisions and 715 to 800 mm by 1 mm divisions **\$16.00**
- 876. **BAROMETER, Aneroid, English and Metric Scales**, with weather marks arranged for sea level readings. This instrument is provided with an adjustment which renders it suitable for use in any location from sea level to 3,500 feet elevation.
 The adjustment is very simple and no derangement of the working parts is necessary. Once adjusted for a given location by the observer, no further adjustment is required. A list showing altitudes of Meteorological Stations in the United States is furnished with each barometer, and also a simple weather forecast card.
 To adjust the barometer for altitude for a given city, town or location, turn the brass plate set in the back of the case (this is easily done with the fingers) until the number of feet corresponding to the elevation of the city or town is opposite the arrow. The hand will then point to the proper weather mark and the reading will be the same as that of the U. S. Weather Bureau, which is Sea Level Reading.
 Spun brass case, 5 inches in diameter; enameled dial; adjustable stationary hand for marking the last position of the movable hand. Range, 26 to 31 inches by 0.02 and 650 to 790 mm by 1 mm **15.00**
- 877. **BAROMETER, Aneroid**. Same as No. 876, but with dial graduated from 22 to 29 inches, for use in altitudes between 3,500 and 7,000 feet. With English and metric scales..... **13.00**
- 880. **BAROMETER, Aneroid, English and Metric Scales**, as adopted by the United States Navy. An accurate instrument with practically all parts constructed of non-corrosive metals such as nickel-silver or phosphor bronze. The dial is of silvered metal with open center. It is divided with great accuracy in both inches and millimeters from 26 to 31 inches by 0.02 inches and from 650 to 790 millimeters by 1 millimeter divisions. The movement is extra-grade, compensated for temperature changes, thus insuring accurate readings of barometric pressure at all times. The case is of lacquered brass and is five inches in diameter. For altitudes up to 3,500 feet. **20.00**



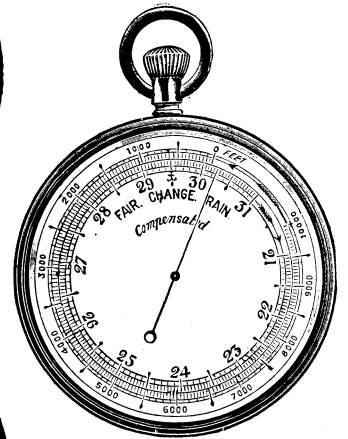
No. 881.



No. 882.



No. 886.



No. 884.

881. **BAROMETER, Aneroid, English and Metric Scales.** Brass case, 5 inches in diameter; open enameled dial; visible works. Graduated from 26 to 31 inches in divisions of 0.02 inch, and from 650 to 790 mm by 1 mm. For use in altitudes up to 3,500 feet..... \$10.00

882. **BAROMETER, Aneroid, 4 inch card dial, open face, nickel-plated case.** Graduations in both English and metric systems. For altitudes up to 3,000 feet. Without altitude scale. Range, 27 to 31 inches by 0.05 and 690 to 790 mm by 1 mm..... 6.00

884. **BAROMETER, Aneroid, pocket mountain type, watch case form, 1 3/4 inches in diameter, highest quality, compensated for temperature, silvered metal dial, revolving altitude scale, in gilt case.** Enclosed in neat morocco case.

	A	C
No.	3,000	16,000
For altitudes up to, feet.....	10	100
Size of divisions, feet.....	34.50	36.50
Each		

886. **BAROMETER, Aneroid, Surveying,** especially designed and constructed for the purpose of readily ascertaining slight variations in gradients, levels, etc. Besides extreme sensitiveness, the specialty claimed for this instrument is an arrangement of the scale of altitudes which admits of subdivisions by a vernier. Compensated for temperature changes and reads to two feet of altitude scale. 3 inch bronze metal case, silvered metal dial, with vernier scale moved by rack-work motion, reading lens arranged to traverse the entire circle, altitude scale 6,000 feet, in solid leather sling case. Weight, 38 ounces 92.00

890A. BAROMETER, MERCURIAL, Cenco-Improved Design (Patented).

Hitherto all low-priced barometers have consisted essentially of a wooden back to which was rigidly secured the barometer cistern, tube, and scale, and the thermometer when this was provided. In such instruments the risk of breakage is great, and the accuracy of reading is doubtful since changes in humidity cause shifting of the scale relative to the zero point of the mercury column.

The Cenco-improved design, in its general lines, resembles the U. S. Weather Bureau type. The barometer tube is completely enclosed in hexagonal brass tubing, to which are attached the metric and British scales. At the upper end of the barometer there is a substantial ring which permits free suspension. The construction of the cistern eliminates the usual leather bag used in Fortin style barometers, but permits fine adjustment of the mercury level. The thermometer is secured to the brass case.

Some of the resulting advantages of this design over the obsolete wood-backed form are:

1. Freedom from error due to warping of wood, and permanent adjustment of scale relative to the ivory zero-index.
2. Greater protection to barometer tube, minimizing the likelihood of breakage.
3. Possibility of making temperature corrections, since brass, glass and mercury are the substances involved, to which instructions in the manuals are directly applicable. Location of the thermometer directly on brass tube is an aid to accuracy.
4. The instrument automatically hangs plumb.

In addition to these points, the elimination of the leather bag does away with the annoyance of loss of mercury by leakage when the leather becomes old. This feature is patented, and is found only in the Cenco-improved design.

Finally, there is such an improvement in appearance over the wood-backed old style instrument that there is no comparison.

Specifications:

Tube: Full 4 mm bore, filled with redistilled mercury by our specially devised vacuum process.

Scale: Range 600 to 800 mm, or 24.5 to 31.5 inches; verniers read to 1/10 mm and 5/1000 inch; scale and verniers silver finish.

Thermometer: Graduated both Centigrade and Fahrenheit.

Finish: Oxidized and lacquered.

Complete as described..... \$35.00

891A. **BAROMETER, MERCURIAL, Cenco-Improved Design, (Patented),** for high altitudes. Similar to No. 890A, but with range of scale 500 to 700 mm or 19.5 to 27.5 inches..... 40.00

894. **BAROMETER, Standard Mercurial, United States Weather Bureau Type, Fortin Principle.** This barometer is of the highest type of excellence, indorsed by the United States Weather Bureau and fully warranted by the manufacturer. The mercury tube is inclosed in a brass body with gun-metal finish, having at its upper end two vertical openings, in which the vernier works, the latter operated by a rack and pinion movement. The readings are taken through these openings, aided by light reflected from a white opaque glass reflector attached to the board behind. The scale is graduated on one side in inches and 10ths, and on the other in centimeters and millimeters, the vernier enabling a reading to be taken, in each case respectively, of one hundredth of an inch and one-tenth of a millimeter. The attached thermometer consists of a well seasoned tube with both Centigrade and Fahrenheit scales, with the figures etched on the stem. It is so mounted that it can easily be removed for testing, etc. Reads down to 25½ inches and is therefore not satisfactory for altitudes above 3,500 feet.

Complete with board back of finely finished hardwood, to which is attached a brass bracket to receive the ring in the top of the barometer, a ring with steadying screws to clamp about the cistern, and white opaque glass reflectors forming a translucent background for reading the instrument..... 71.00

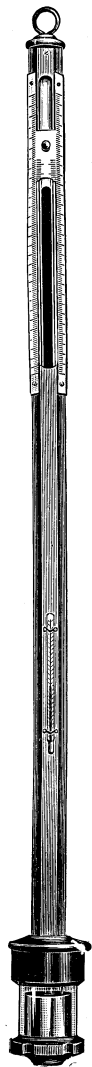
895. **BAROMETER, Standard Mercurial, United States Weather Bureau Type.** Same as No. 894, but without the board back..... 60.00

896. **Back only of No. 894 Standard Barometer..... 11.00**

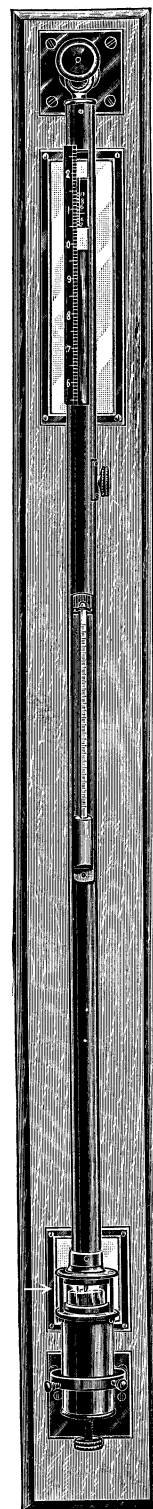
898. **BAROMETER, Standard Mercurial, United States Weather Bureau Type.** Same as No. 894, but with a scale reading down to 20 in. for use in altitudes up to 10,000 feet..... 92.50

899. **BAROMETER, Standard Mercurial, United States Weather Bureau Type.** Same as No. 898, but without the board back..... 80.00

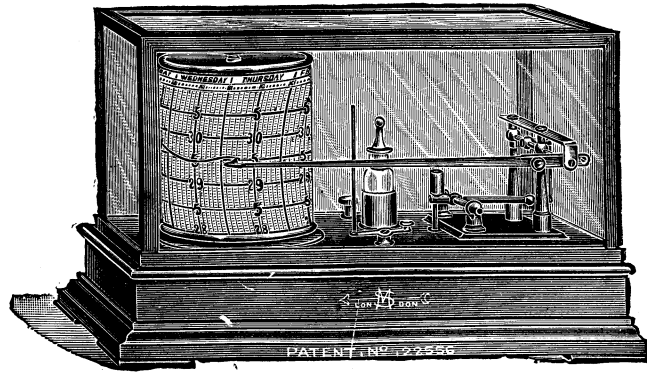
900. **Back only of No. 898 Standard Barometer, described under No. 894..... 12.50**



No. 890A.



No. 894.



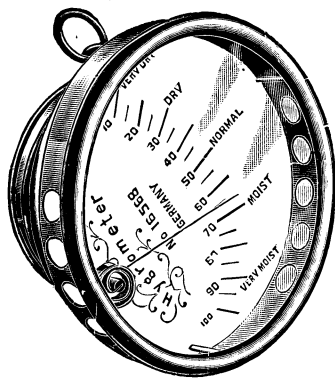
No. 908.

908. **BAROMETER, Recording (Barograph)**, in mahogany case, with glass top and sides, and storage space for charts.

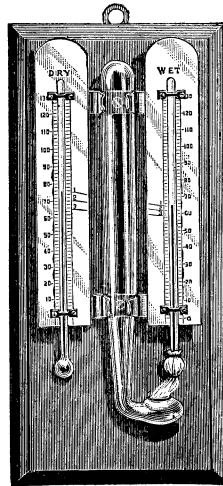
This instrument enables one to keep a continuous record of changes in the pressure of the atmosphere by means of which the approach of a "low" or "high" may be predicted from the record on a single chart, covering a period of one week. For statistical purposes the charts may be readily filed and indexed chronologically for quick reference. Complete with charts for a year, pen and ink..... \$50.00

909. **Barograph Charts**, for No. 908 Barograph. In boxes containing one year's supply.per box 3.00

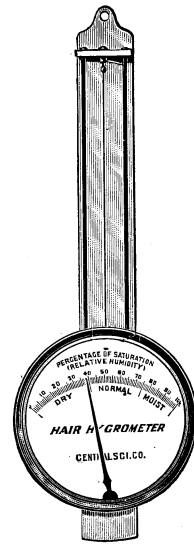
Note:—In ordering Barograph charts, to insure fit it is necessary to send in a sample of the kind in use.



No. 7809.



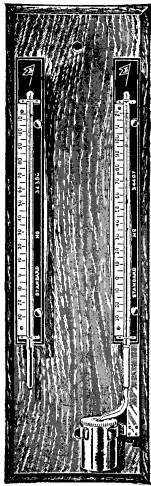
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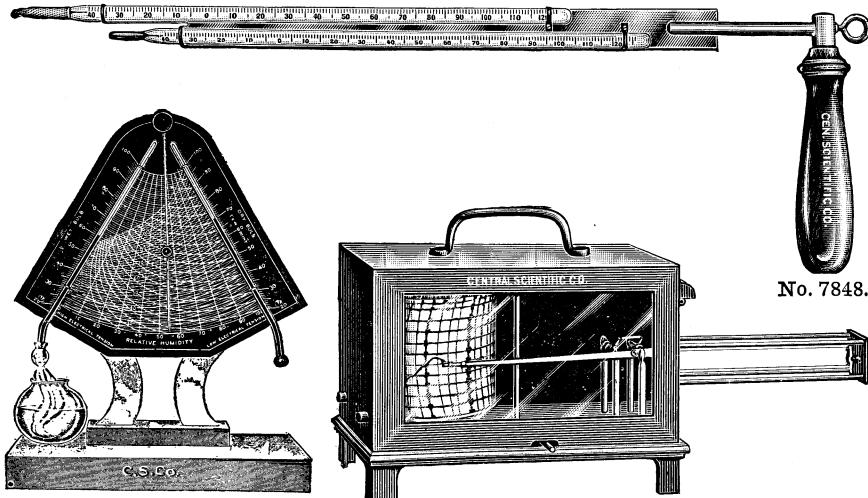
No. 7810.

HYGROMETERS

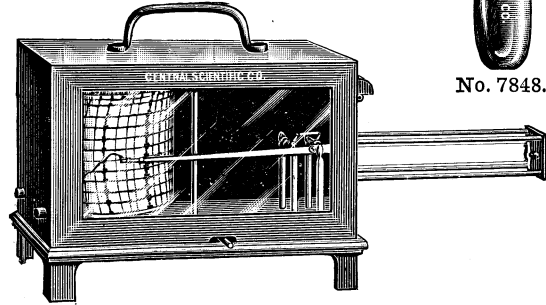
7809. **HYGROMETER, Simple Form**, for indicating the humidity of the air without reference to tables. In spun brass case, 3 inch dial..... 3.00
7810. **HYGROMETER, Hair**. Scale denotes the humidity of the air without reference to tables. In brass case, 3 inch dial..... 12.00
7814. **HYGROMETER, Mason**, for determining humidity and dewpoint. Metal scale thermometer of approximate range from 10° to 120°F., mounted with insulating support on a mahogany finish board 8½x4½ inches. Glass cistern and special wick, with complete humidity tables... 5.00
7815. **Cistern only** for No. 7814..... .75
7816. **Thermometer, Dry Bulb**, for No. 7814..... 2.00
7817. **Thermometer, Wet Bulb**, for No. 7814..... 2.00



No. 7826.



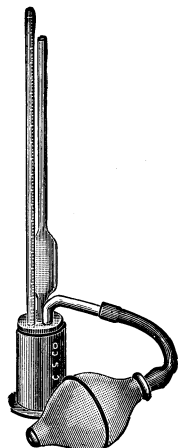
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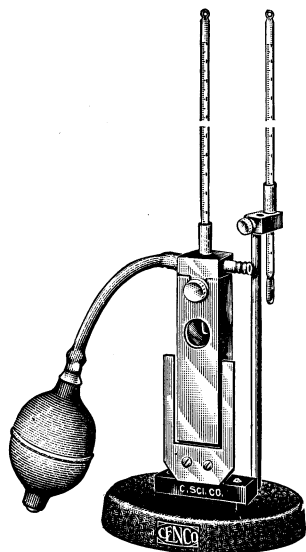
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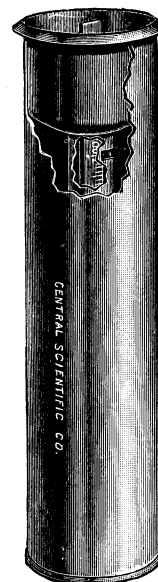
- 7820. **HYGROMETER, Mason**, simpler form than No. 7814. Thermometers not raised, mounted on oak board 8½x4½ inches. With complete humidity tables \$4.00
- 7821. Cistern only for No. 7820..... .75
- 7822. **Thermometer, Dry Bulb**, for No. 7820..... 1.60
- 7823. **Thermometer, Wet Bulb**, for No. 7820..... 1.60
- 7826. **HYGROMETER, Standard**, consisting of two Standard Thermometers (like No. 13720) mounted on a finely polished hardwood back 17x5 inches, metal cistern with wick, and certificate for each thermometer.... 13.50
- 7832. **HYGROMETER (Hygrodeik)**, an improved form of the Mason Hygrometer. Consists of two thermometers, wet and dry bulbs, mounted upon the outer edge of a chart which has been plotted from new and corrected tables prepared under the direction of the U. S. Weather Bureau. This chart, while complicated in appearance, is very simple and obviates entirely the use of tables for temperatures between 20 and 120 degrees Fahrenheit. Size of instrument, 10x7¼x3 inches. Full directions furnished with each instrument..... 17.50
- 7833. **Thermometer, Dry Bulb**, for No. 7832..... 3.25
- 7834. **Thermometer, Wet Bulb**, for No. 7832..... 3.25
- 7844. **HYGROMETER, Registering (Hygograph)**, for furnishing continuous record of humidity over a period of 7 days. Complete with charts for one year..... 60.00
- 7845. **Charts for No. 7844**.....Per box of 55 2.50
- 7848. **HYGROMETER, Sling Psychrometer**, designed for the purpose of obtaining quicker and more accurate results than are possible with the stationary wet and dry bulb instruments. Two special thermometers, carefully selected, are mounted on a nicely finished metal plate provided with a wooden handle and swivel, and a ring for suspending the instrument when not in use. Approximate range 0° to 100°F. in 1° divisions 6.50
- 7849. **Thermometers only of No. 7848**.....Each 1.60
- 7852. **HYGROMETER, Sling Psychrometer, Standard Grade**. Similar to No. 7848, but with thermometers of highest grade, graduated in half degree divisions, and with a copper protecting case 16¼ inches long..... 11.50
- 7853. **Thermometers only of No. 7852**.....Each 4.00
For experiments employing the Sling Psychrometer, see Ing. p. 90; S. & H. p. 78; Z. & E. p. 71.
- 7860. **Hygrometer Wick, Silk**, fits any of our hygrometers15



No. F2031.



No. F2034. (Shown in use with No. 11530 Bulb and Thermometers.)



No. 6480.

F2031. **DEW POINT APPARATUS** according to Millikan, Gale and Bishop, Exp. 10A. By means of a bulb, air is blown through ether contained in a small nickel-plated brass vessel, 28x54 mm. Complete, without thermometer..... \$0.90

F2034. **DEW POINT HYGROMETER, Alluard's Form.** This form of dew point hygrometer is designed to give the greatest possible precision in the determination of the dew point temperature. A square nickel-plated and highly polished tube for containing ether is mounted on a heat-insulating support. A stream of air is bubbled through the ether to produce cooling. The temperature of the highly polished surface is thus lowered to the point at which the water vapor of the air begins to condense. To facilitate accurate determination of the temperature at which condensation begins, there is mounted on each side of the front surface of the ether tube, but not in thermal contact with the latter, a strip of highly polished nickel-plated brass. By observing the adjacent surfaces simultaneously the formation of the mist is very readily perceived. As soon as this occurs the temperature of the ether is read on a thermometer inserted in the tube. Another thermometer, mounted on the same base with the apparatus, but with its bulb sufficiently removed from the ether tube so that room temperature will be correctly indicated, completes the equipment necessary for determining the humidity.

For greatest accuracy of measurement, the instrument should be protected from air currents, and the observer should stand several meters away, noting the formation of cloudiness and reading the thermometers with a telescope, to avoid error due to body heat.

As described and illustrated, but **without aspirator bulb or thermometers**..... 12.50
For experiments employing No. F2034, see *Mil. p. 164; S. & M. Exp. 44.*

11530. **Rubber Bulb**, with hard rubber valves, for pressure only, with connecting tube. For use in blowing air through the ether tube of F2034. Capacity, about 50 cc.....**Each** .40
Per dozen 4.30

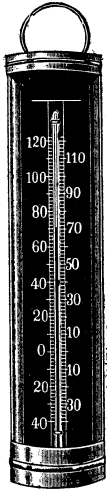
13438B. **Thermometer** for No. F2034. Range 0° to 50°C., graduated in 1/10°. Two needed...**Each** 5.50

6480. **RAIN GAGE**, similar to United States Weather Bureau type, but smaller and therefore not so accurate. A zinc vessel 3 inches in diameter by 13 inches long, in the top of which is placed a copper cup having an open top exactly 3 inches in diameter with sharp edge and projecting rim. The bottom of this copper cup is open and fits in the top of a brass tube 1 inch in diameter in which the amount of rain is measured. This tube is provided with an overflow opening and a wood rule graduated for reading the rainfall directly to 1/100th of an inch..... 4.00

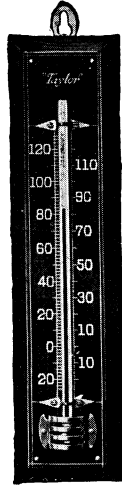
6480A. **Measuring Stick** only of 6480..... .60

6482. **RAIN GAGE**, United States Weather Bureau Standard, similar to No. 6480, but 8 inches in diameter and 23 inches long, with both inner and outer tubes of brass. Complete with measuring stick 12.00

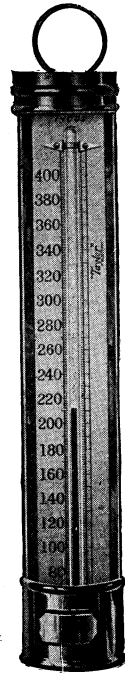
6482A. **Measuring Stick** only of 6482..... .75



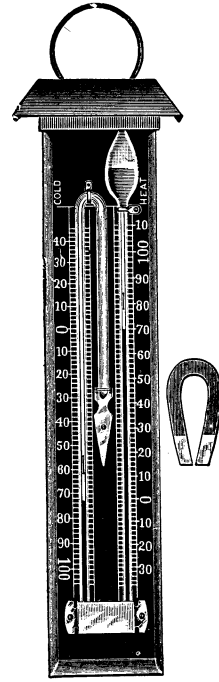
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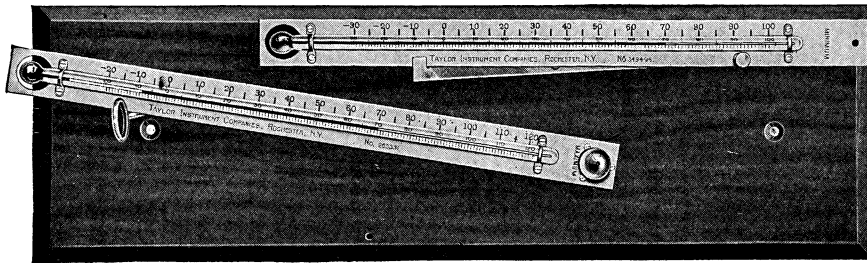
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No. 13590B.



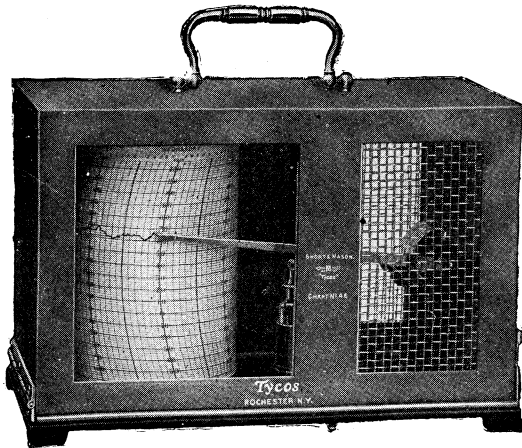
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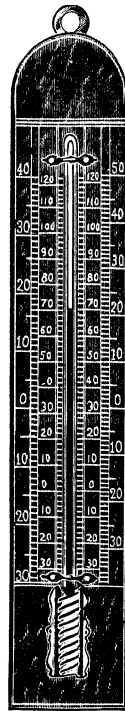
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THERMOMETERS

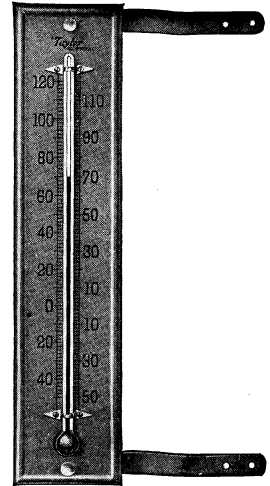
- 13562. **THERMOMETER, Household, standard grade, 10 inch, heavy janned tin case, accurately tested. Approximate range,—20° to 120° F** \$2.00
- 13564. **THERMOMETER, Household, 8 inch, metal scale, oak back, beveled edge, with brass guard over bulb. Approximate range,—20° to 120° F** 1.40
- 13578. **THERMOMETERS, Maximum and Minimum Registering, U. S. Weather Bureau Pattern, with graduations etched on stem over a range of approximately — 20° to 120° F. The thermometers are mounted on 12 inch aluminum strips on which is marked every 5 degree line of the scale, and the figures every 10 degrees. The aluminum strips are insulated from the wood back by a brass insulating support and fastened by brass knurled screws. Mounted on mahogany finished back, 17x5 inches. With manufacturer's certificate for each thermometer.** 12.00
- 13579. **Thermometer, Maximum, only for No. 13578. With manufacturer's certificate.**..... 6.00
- 13580. **Thermometer, Minimum, only for No. 13578. With manufacturer's certificate.**..... 6.00
- 13584. **THERMOMETER, Maximum and Minimum Registering, Six's Pattern, in janned tin case with metal scale. Length, 8 inches; approximate range, —20° to 120° F. Complete with horseshoe magnet for resetting.**..... 6.00
- 13590B. **THERMOMETER, Metal Scale, highest grade, with scale of oxidized brass in black janned tin case. Range, 0° to 220° F. Length, 10 inches** 2.00



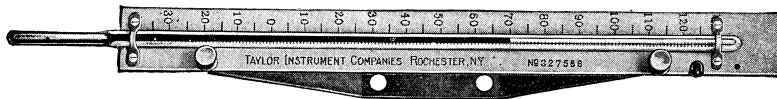
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No. 13716.

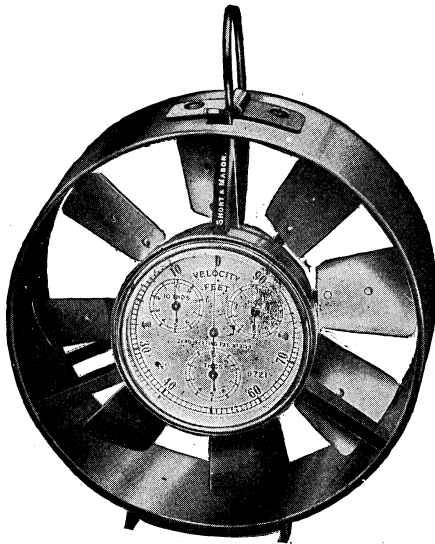


No. 13724.

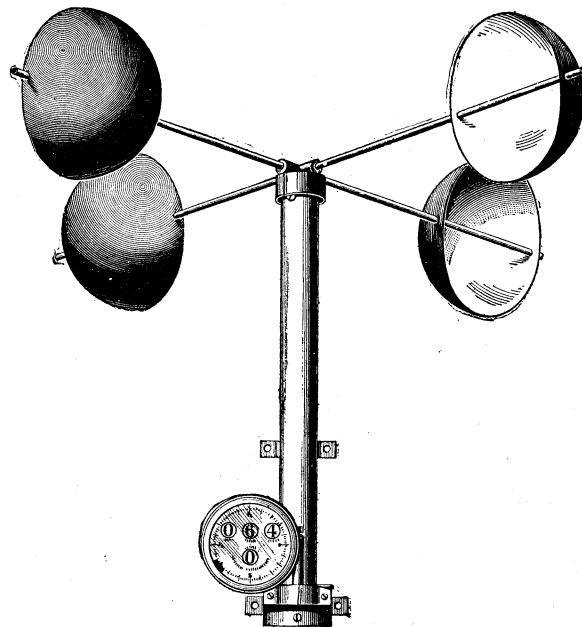


No. 13720.

13676. **THERMOMETER, Recording (Thermograph).** Made in America. A most accurate thermometer which will not vary its standard for years. A complete record is given by a pen upon a printed chart for an entire week, and by its form the exact thermometric reading can be seen at any moment, as well as the varying line traced by the pen for the time preceding. The charts are changed at the beginning of each week and can be retained as a record for the entire year. Mechanism consists of a spiral lamina of non-rusting material, which is exposed to the atmosphere at the end of the case. It is extremely sensitive and, having no levers in its construction, is very rigid. In non-corrosive metal case with glass front and screened openings on three sides about the lamina, and with storage space for charts. Range, 0° to 100° F. in 2° divisions. May ordinarily be used for any range of 100° F. between -20° and + 250° by means of No. 13683 Unfigured Charts. Complete with full directions for use, charts for one year, pen and ink..... \$50.00
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13683. **Thermograph Charts, Unfigured,** for use with No. 13676. Range, 100° F. in 2° divisions. In boxes containing a year's supply.....Per box 3.50
- Note:**—In ordering thermograph charts, to insure fit, it is necessary to send in a sample of the kind in use.
920. **Ink, purple,** for barographs and thermographsPer bottle .55
- Note:** For **THERMAL RECORDER** see page 52.
13716. **THERMOMETER, Three Scale,** boxwood, F., R. and C. scales..... .60
13720. **THERMOMETER, Weather Bureau Standard,** 12 inch, cylindrical bulb, graduation etched on tube. The tube is mounted on an aluminum scale on which is marked every 5 degree line of the scale, and the figures every 10 degrees. Has brass insulating support and binding screws. Approximate range, -30° to 120° F. With manufacturer's certificate..... 7.00
13724. **THERMOMETER, Window,** for weather observations, with magnifying tube, alcohol filled, mounted on nickel-plated metal back, with brackets for attachment to window frame. Length, 10 inches; approximate range, -40° to 120° F. 1.40



No. 180.



No. 184.

14390. **WEATHER FORECAST CHART, or Key to Barometer Reading, and Chart for Aneroid Barometer,** by J. Benj. F. Rawson, late of the Weather Bureau. This chart is intended as an aid in the intelligent interpretation of barometer readings and in forecasting weather for twenty-four hours. This chart will be found quite accurate and most useful in any science laboratory. With full directions..... \$1.00
14392. **“WEATHER AND WEATHER INSTRUMENTS.”** This book describes the mechanism of the many instruments and in addition gives in concrete and simplified form the practical uses of the different instruments. The tables of classified data recommend it particularly to teachers. Pasteboard covers67
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184. **WIND GAGE, Anemometer,** for indicating the velocity of the wind in miles, consisting of a vertical shaft, to the upper end of which are fastened four arms, each carrying a Robinson hemispherical copper cup. These cups turn in one direction, regardless of the direction of the wind. The registering dial is so divided as to show velocities from one hundredth of a mile to 10,000 miles. All parts are interchangeable. Each instrument is standardized and fully warranted. Weight, 3½ lbs..... 42.00