

# LABORATORY APPARATUS

FOR

CHEMICAL, INDUSTRIAL, METALLURGICAL,  
BACTERIOLOGICAL, BIOLOGICAL, BOARD  
OF HEALTH, CLINICAL, HOSPITAL AND COM-  
MERCIAL TESTING LABORATORIES

## CATALOG C

No. 227



Established  
1889

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

Incorporated  
1900



## CENTRAL SCIENTIFIC CO.

460 East Ohio Street

(Lake Shore Drive, Ohio and Ontario Streets)

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## BAROMETERS, ANEROID

Aneroid barometers have many uses which cannot be adequately served by mercurial barometers.

(1) They are portable and can be packed in a field kit or even in smaller sizes carried in the pocket for field purposes.

(2) They can be obtained provided with an altitude scale which makes them useful for geological surveys or for determining the altitude of various elevations.

(3) A high-grade aneroid barometer can be obtained which is more sensitive to slight changes in pressure than is a mercurial barometer. This is due to the multiplying mechanism by which an inch on a mercurial barometer scale is spread out to double that space on an aneroid scale.

(4) Aneroids can be obtained with an altitude adjusting dial, like No. 876, by which readings

correct at any altitude can be made to agree with those at sea level. This is a valuable feature when weather forecasting is done, and when results are being compared with U. S. Weather Bureau reports.

(5) All but the lowest priced aneroids are compensated for temperature changes which makes corrections for temperature unnecessary. This makes them much more convenient than mercurial barometers.

(6) The open scale and sharply pointed needle make an aneroid very easy to read, while some degree of skill with a vernier is required for obtaining correct readings with a mercurial barometer.

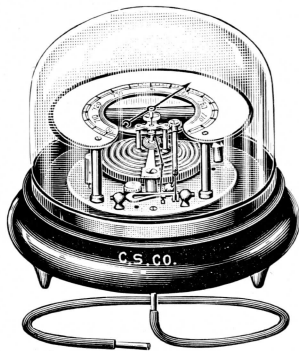
(7) There is no correction for capillarity as in a mercurial barometer.

### Points to Be Considered in Purchasing an Aneroid

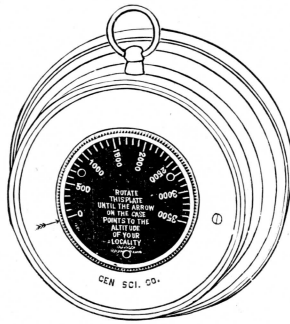
1. There is nothing to be gained by purchasing cheap aneroid barometers if accurate readings are desired. For this reason, we have discontinued listing the cheap 4-inch card dial barometers formerly sold in large quantities.
2. An aneroid barometer must be compensated for temperature effects if it is to give dependable readings.
3. There have been on the market barometers in which the multiplying mechanism was connected to the shaft of the index needle by a thread. Nothing but the best grade of fusee chain should be used for this purpose.
4. There should be provision for setting the barometer needle by an adjusting screw which can be reached through the opening in the case.
5. Aneroid barometers undergo a change after a certain interval of time due to fatigue of the spring or the diaphragm. They should therefore be checked by comparison with a Weather

Bureau standard mercurial barometer at least once every three months at the nearest Weather Bureau station.

6. On the lower grade of aneroid barometers the readings should not be considered accurate to within more than plus or minus  $\frac{1}{4}$  inch or 6 mm.
7. Only silvered or enameled metal dials should be considered acceptable in aneroid barometers. Others become discolored and difficult to read.
8. A high grade aneroid barometer should be handled like a watch since it is subject to damage if dropped or jarred severely.
9. An aneroid barometer should be protected from moisture since there are metal parts which corrode if brought directly in contact with moisture.
10. Aneroid barometers are provided with a hook and should be hung on a wall, rather than placed on a table, for protection from damage.

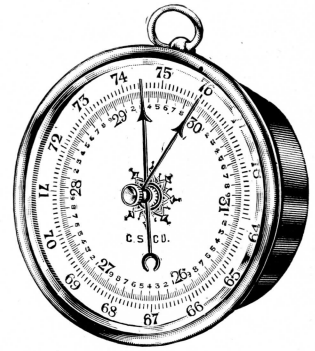


No. 872



No. 876

(Showing Altitude Adjustment Dial on Back)

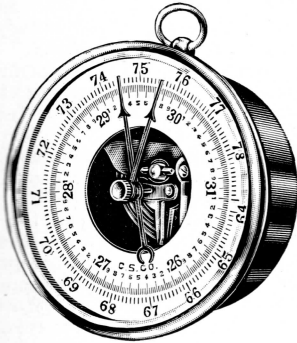


No. 876

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. Dimensions: diameter of base, 16.5 cm; diameter of glass case, 12.7 cm; height over all, 12.5 cm. Complete with rubber tube and glass mouthpiece. \$16.00

876. **BAROMETER, Aneroid, with Altitude Adjustment Dial, Graduated in English and Metric Units.** This is an excellent barometer for either educational or private uses. It possesses practically all the features of a high grade barometer and, in addition, has a dial on the back graduated in altitudes from zero to 3500 feet by 100 foot divisions which can be set to give readings correct at sea level for any altitude within that range. This adjustment is readily made by turning the milled edge dial with the fingers. A table of altitudes of all the meteorological stations in the United States is furnished with the barometer to assist in making the proper altitude adjustment. When once made, this remains correct, except for the periodic rechecking referred to in the prefatory paragraph above.

Continued on next page.



No. 880



No. 881



No. 884A

**BAROMETER, Aneroid, with Altitude Adjustment Dial—Continued**

Diameter of dial, 5 inches (12.7 cm).  
 Kind of dial, enameled metal without open center.  
 Kind of case, lacquered brass.  
 Range of graduation, metric, 65 to 79 cm by 0.1 cm.  
 Range of graduation, English, 26 to 31 inches by 0.02 inches.

Not compensated for temperature changes.  
 Provided with hook, without feet.  
 Provided with stationary hand for comparison.  
 For altitudes up to 3500 feet.  
 Weather indications on dial.

Price..... \$15.00

**877. BAROMETER, Aneroid, with Altitude Adjusting Dial, of the same construction and specifications as No. 876 but with brass adjusting plate graduated for correction to sea level readings at altitudes from 3500 to 7000 feet. With English and metric scales..... 18.00**

**880. BAROMETER, Aneroid, Navy Type, with Temperature Compensated Movement.** This is a high grade barometer suitable for practically any use in which an aneroid is found preferable to a mercurial barometer with a further advantage over No. 876 for educational purposes in the fact that the dial is cut away in the center to form an opening 55 mm in diameter through which its movement and its various parts are plainly visible. Practically all parts of this barometer are constructed of nickel-silver or phosphor bronze, rendering it practically non-corrosive in the presence of moisture. Its readings are accurate at all ordinary temperatures because of the compensated movement.

Diameter of dial, 5 inches.  
 Kind of dial, silvered metal with open center 55 mm in diameter.  
 Kind of case, lacquered brass.  
 Range of graduation, metric, 65 to 79 cm by 0.1 cm.

Range of graduation, English, 26 to 31 inches by 0.02 inches.  
 Compensated for temperature changes.  
 Provided with hook, without feet.  
 Provided with stationary hand for comparison.  
 For altitudes up to 3500 feet.

Price..... 20.00

**881. BAROMETER, Aneroid, Laboratory Type, with Porcelain Enameled Dial, with Weather Indications.** We recommend this barometer to educational institutions which wish to possess a good grade of aneroid barometer for use in place of a mercurial barometer for atmospheric pressure determinations, or for the purpose of demonstrating the aneroid and its use. The movement while not compensated for temperature effects is of good grade with fusee chain connection and tempered steel spring. The dial being covered with porcelain enamel is permanent and the graduations are easily read. An adjusting screw accessible through an opening in the case at the back permits corrections for altitude or resetting at periodic recheckings. (See prefatory paragraph on previous page.) In addition to the ring support, the barometer is provided with feet so that it will stand vertically on a table.

Diameter of dial, 5 inches.  
 Kind of dial, porcelain enameled, cut away in center.  
 Kind of case, lacquered brass.  
 Range of graduation, metric, 69 to 79 cm by 0.1 cm.  
 Range of graduation, English, 27 to 31 inches by 0.1 inches.

Not compensated for temperature changes.  
 Provided with hook, with feet to stand on table.  
 Provided with stationary hand for comparison.  
 For altitudes up to 3500 feet.  
 Weather indications on dial.

Price..... 9.00

**Note:** We no longer list the cheap 4-inch card dial type of aneroid barometers commonly offered to educational institutions as our experience with them has convinced us that their life is so short that there is no economy in purchasing them. We do not recommend the purchase of any instrument of lower grade than No. 881.

**884A. BAROMETER, Aneroid, Watch Case or Pocket Type, with Altitude Scale, for Topographical Survey or Geological Exploration Work.** These barometers are constructed with the highest grade of compensated movement so that their readings are accurate at any ordinary temperatures. Their small size, 1 3/4 inches in diameter, makes them very convenient to carry in the pocket on field trips. At the same time their accuracy is such that their readings are as reliable as are those of the best 5-inch aneroid. Two scales are provided, the inner one being in inches from 26 to 31 inches in 0.10 inch divisions. The outer scale which can be revolved by means of the milled ring is the altitude scale, reading from 0 to 6000 feet in 100 foot divisions. The needle is provided with a very fine pointer making it possible to estimate altitudes within 10 feet. The barometer is provided with an adjustment screw accessible through an opening in the case at the back by which the pointer can be set correctly by comparison with a Weather Bureau standard instrument. The instrument comes in a velvet lined leather hinged case with a spring snap. The case is gold plated and the dial is silvered, giving it a beautiful appearance which is quite permanent. This is a high grade instrument in every respect and one which will give as much satisfaction to the user who requires a good barometer as does a good time piece..... 25.00

**884C. BAROMETER, Aneroid, Watch Case or Pocket Type, with Altitude Scale, for Topographical Survey or Geological Exploration Work, identical in construction with No. 884A, but with altitude scale reading from 0 to 12000 feet in 100 foot divisions..... 27.00**



888. **BAROMETER, Aneroid, Altitude Type**, for use in determining altitudes as in topographic surveying, geological prospecting and field engineering. This is a high grade barometer with best type of movement properly compensated for temperature changes. An altitude scale from 0 to 5000 feet in 20-foot divisions surrounds the inner scale of inches around which it can be revolved by means of a milled ring. In beginning a survey the altitude scale is turned until the needle points to the altitude for the particular station from which the survey is to be made. All readings made thereafter will give correct altitudes. Changes in atmospheric pressure due to weather changes must, of course, be taken into consideration. A special feature of

the design of this instrument is the equal divisions of the altitude scale which make readings correct at all points. The instrument is mounted in a polished aluminum case instead of the usual lacquered brass case giving it a beautiful appearance which is permanent. A velvet lined leather carrying case with a strap for slinging it over the shoulder is provided.

No. 888  
 Diameter of dial, 3 inches (75mm).  
 Kind of dial, silvered metal.  
 Kind of case, polished aluminum.  
 Range of graduation, English, 26 to 31 inches in 0.02 inches.  
 Compensated for temperature changes.

Provided with hook, without feet.  
 Provided with stationary hand for comparison.  
 Weight, 9 ounces (256 g).  
 Altitude range, 0 to 5000 feet in 20-foot divisions.

Price ..... \$42.00

**BAROMETERS, MERCURIAL**

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 English 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 adjustments 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:**

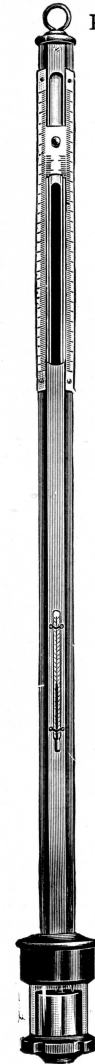
**Tube:** Full 4mm bore, filled with redistilled mercury by our specially devised vacuum process.

**Scale:** Range 600 to 800 mm, or 24.5 to 31.5 inches, for altitudes up to 3,500 feet; verniers read to 1/10 mm and 5/1000 inch; scale and verniers silver finish.

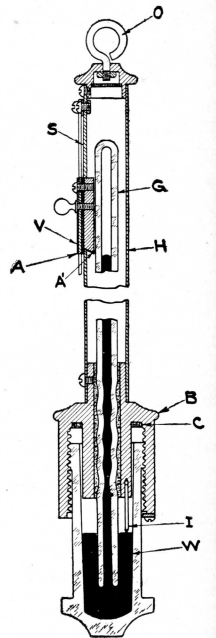
**Thermometer:** Graduated both Centigrade and Fahrenheit.

**Finish:** Oxidized and lacquered.

Complete as described..... 25.00



No. 890A



Enlarged View of Cistern Showing Details of Construction

891A. **BAROMETER, Mercurial, Cenco-Improved Design (Patented)**, for high altitudes, from 1,500 up to 8,000 feet. Similar to No. 890A, but with range of scale 500 to 700 mm or 19.5 to 27.5 inches.... 30.00

**Note:** Mercurial barometers can be shipped only by express.

**894. BAROMETER, Standard Mercurial, United States Weather Bureau Type, Fortin principle.** This barometer is of the highest type of excellence, endorsed by the United States Weather Bureau, and fully warranted by the manufacturer. The mercury tube is enclosed 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.

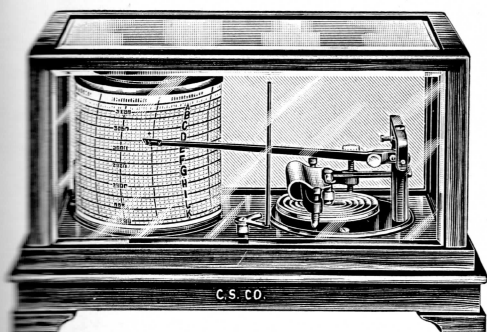
Complete with board back of finely finished hardwood, to which is attached a brass bracket to receive the ring in the top of the barometer, a ring with steadying screws to clamp about the cistern, and white opaque glass reflectors forming a contrasting background for reading the instrument..... **\$88.50**

**895. BAROMETER, Standard Mercurial, United States Weather Bureau Type.** Same as No. 894, but without the board back..... **75.00**

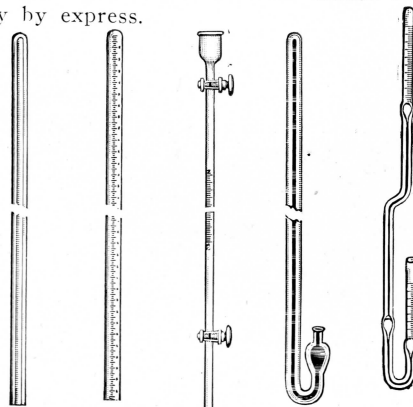
**896. Back only of No. 894 Standard Barometer**..... **13.50**

**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..... **120.00**

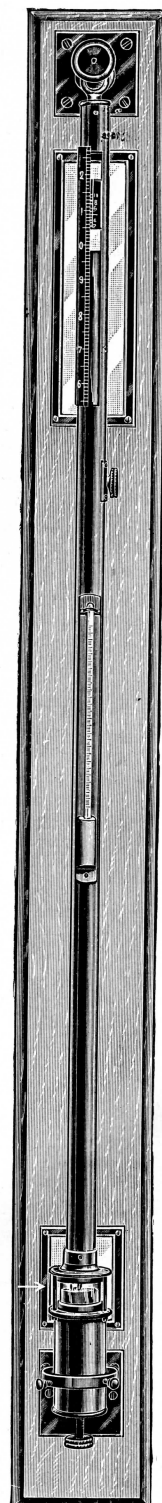
**Note:** Mercurial barometers can be shipped only by express.



No. 908



No. 922 No. 926 No. 928 No. 932 No. 934



No. 894

**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..... **62.50**

**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.

**920. Ink, purple, for Barographs and Thermographs**..... **Per bottle .55**

**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**..... **.75**

**926. BAROMETER TUBE, unfilled, same as No. 922, but graduated in millimeters**..... **2.00**

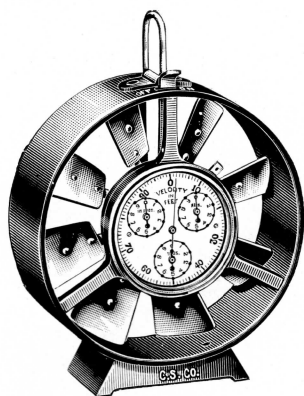
**928. BAROMETER TUBE, Demonstration Form, unfilled, with funnel top and with stopcock at top and bottom for easy filling and emptying of the tube. Total length, 104 cm. Graduated from 100 to 780 mm in millimeter divisions**..... **5.00**

**930. Mercury Well, japanned iron, for use with Nos. 922, 926 and 928. Capacity about 50 cc**..... **.50**

**932. BAROMETER TUBE, Siphon Type, unfilled, with bulb on short arm. Length, 80 cm**..... **.75**

**934. BAROMETER TUBE, Siphon Type, Bunsen's, unfilled. Graduated at the top of each arm in millimeter divisions**..... **3.50**

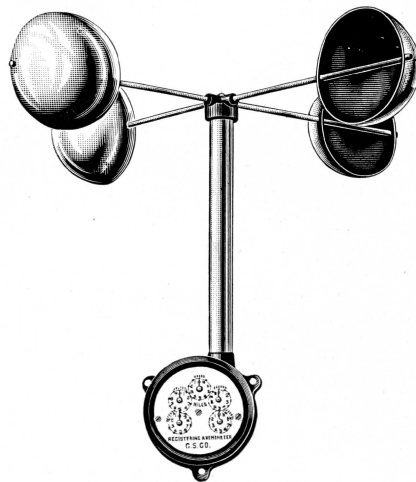
**BASAL METABOLISM APPARATUS, see Metabolism Apparatus.**



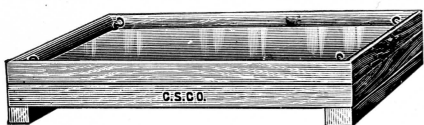
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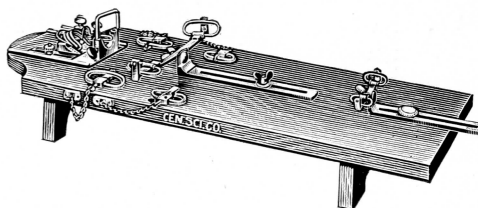
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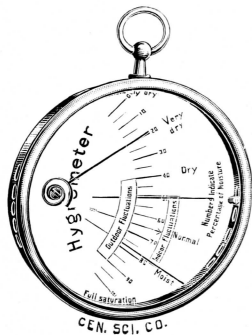


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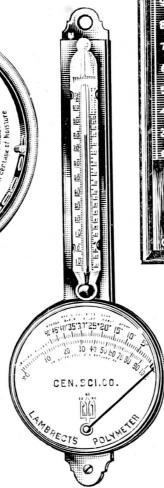


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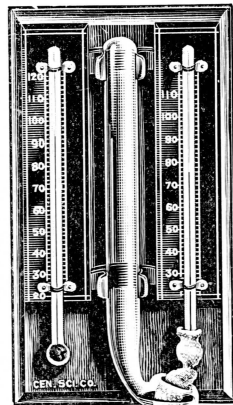
180. **ANEMOMETER, Biram's**, for the measurement of velocity of air currents in schools, public buildings, mines, tunnels, flues and sewers. Especially useful in studying the ventilation systems in schools, hospitals and other public buildings. Widely used in meteorological work for determining direction and velocity of surface winds. The instrument is direct reading from 0 to 100,000 linear feet of total air passing in a given period. The readings are indicated by means of four registering dials, the largest of which reads from 0 to 100 feet. The instrument is accurately made with jewelled bearings and is furnished with a chart of corrections for velocities from 200 to 3000 feet per minute. A zero setting device permits instant return of all pointers to zero. Diameter, 4 inches; weight, 16 oz.; for velocities up to 3000 feet per minute. Complete with threaded socket for attaching to foot, in leatherette case.....\$45.00
182. **ANEMOMETER, S. and M. Airmeter**, similar to No. 180 but with heavy base for stability and with horizontal dials. For purposes requiring a smaller instrument than No. 180 and one which is not easily blown over by strong currents of air. Height over all, 3 inches; diameter of dial, 2½ inches; weight, 8½ oz.; for velocities up to 3000 feet per minute; maximum reading of the 4 dials, 100,000 feet. With jewelled bearings, instantaneous zero setting device, and correction chart for velocities up to 3000 feet. Complete with universal socket holder by which it can be held at any angle in leather case..... 60.00
184. **ANEMOMETER or WIND GAGE**, 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..... 43.00
- 186B. **ANIMAL BOARDS**, of wood, with hook in each corner, for use in animal experiments. Suitable for guinea pigs, rats, cats and small dogs. Length, 650 mm; width, 300 mm..... 5.50
187. **ANIMAL BOARD, Latapie**, for rabbits, guinea pigs, cats, small dogs, ducks and pigeons. The board of heavy oak is 34 inches (86.4 cm) long, 11 inches (28 cm) wide and is raised from the table by means of cleats underneath to a height of about 3 inches (7.6 cm). It is provided with head holders of various sizes and a series of adjustable clamps by means of which the animal under observation can be conveniently and easily held in any desired position. The clamp fastenings are rigid and easily fastened. All metal parts are of solid brass, nickel plated. The board is nicely finished and the entire piece is pleasing in appearance. Complete with clamps as illustrated ..... 70.00



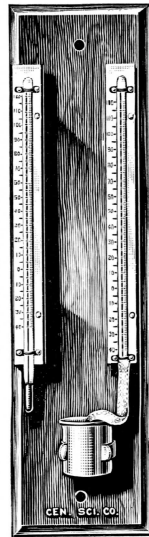
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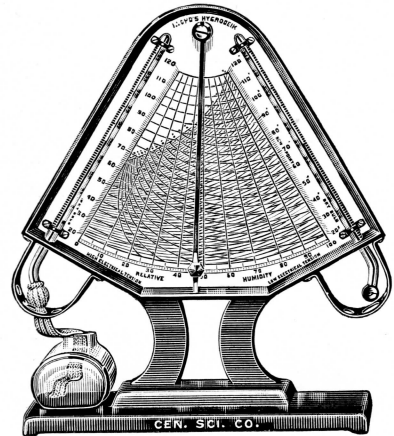
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No. 7814



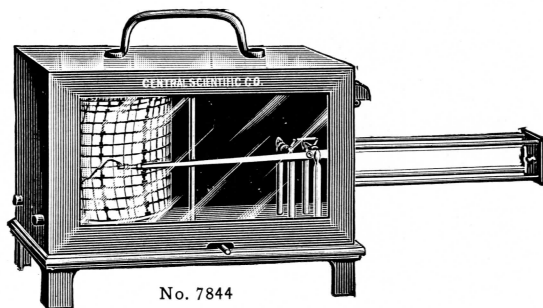
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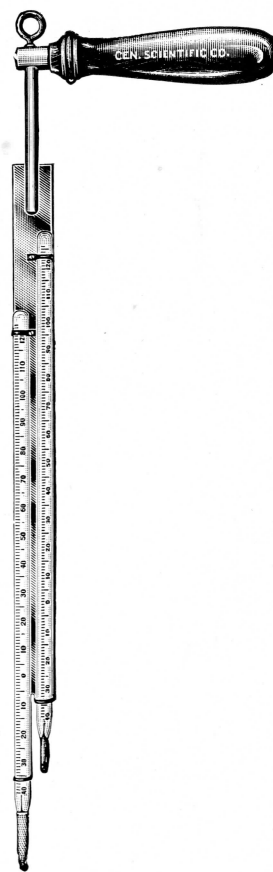
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## HYGROMETERS

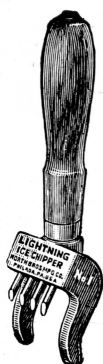
- 7809. **HYGROMETER, Simple Form**, for indicating approximately the relative humidity of the air without reference to tables. In spun brass case, 3 inch dial.....**\$2.25**
- 7810. **HYGROMETER, Hair, Laboratory Grade**, with scale denoting the relative humidity of the air without reference to tables. In brass case, 3 inch dial. This hygrometer should not be confused with the low-priced inaccurate forms like No. 7809 whose readings are only relative. This is one of the most satisfactory of the hair type of hygrometers..... **10.00**
- 7814. **HYGROMETER, Mason**, for determining both relative humidity and dewpoint. Metal scale magnifying thermometers of approximate range from 20° to 120°F. are mounted with insulating support on a mahogany finish board 8½x4½ inches. With glass cistern and special wick, with humidity tables and directions for use..... **5.00**
- 7815. **Cistern only** for No. 7814..... **1.00**
- 7816. **Thermometers, only** of No. 7814..... **Each 2.00**
- 7826. **HYGROMETER, Standard**, consisting of two **Standard Thermometers** (like No. 13720) mounted on a finely polished hardwood back 17x5 inches, with nickel plated brass cistern and wick, and with certificate for each thermometer. With this outfit accurate determinations of humidity and dewpoint can be made. This is the best type of hygrometer to purchase for indoor laboratory use. Its use requires a table of humidities which is furnished with it. With directions for use, packed in cardboard box..... **21.00**
- 7832. **HYGROMETER, Hygrodeik**, an improved form of the Mason Hygrometer, consisting of two thermometers, wet and dry bulb, mounted upon the outer edge of a metal chart which has been plotted from 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°F. This is the most convenient form of wet-and-dry bulb hygrometer and is especially suitable for making routine or daily observations in rooms and class chambers. Size of instrument, 10x7¾x3 inches. Full directions are furnished with each instrument ..... **17.50**
- 7833. **Thermometer, Dry Bulb**, for No. 7832..... **3.25**
- 7834. **Thermometer, Wet Bulb**, for No. 7832..... **3.25**



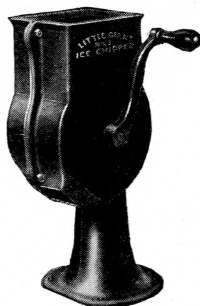
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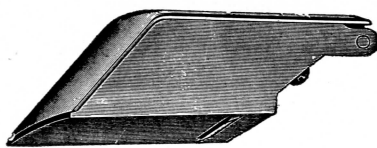
No. 7848



No. 7872



No. 7876



No. 7880

- 7844. **HYGROMETER, Registering Hygrograph**, for furnishing a continuous record of humidity over a period of 7 days. This is a multiple hair type of instrument carefully constructed with sensitive multiplying mechanism and accurately calibrated. The hairs are protected by a skeleton metal frame. Complete with charts for one year..... \$60.00
- 7845. **Charts for No. 7844**.....Per box of 55 2.50
- 7848. **HYGROMETER, Sling Psychrometer, Laboratory Grade**, 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..... 7.00
- 7849. **Thermometers only of No. 7848**.....Each 1.75
- 7852. **HYGROMETER, Sling Psychrometer, Standard Grade**, for accurate determinations of relative humidity. This instrument is similar in design to No. 7848, but is equipped with thermometers of highest grade, graduated in from 0° to 100° F. in half degree divisions, and with a copper protecting case 16¾ inches long..... 11.50
- 7853. **Thermometers only of No. 7852**.....Each 4.00
- 7860. **Hygrometer Wick, Silk**, fits any of our hygrometers ..... .20
- 7872. **ICE CHIPPER** for use in quickly chipping ice to small bits of a size convenient for laboratory purposes. Tinned iron frame, wood handle..... 1.25
- 7876. **ICE CUTTING MACHINE**, with blades which cut the ice into pieces about the size of a pea. Size of opening, 4x6 inches; height, 18 inches; space occupied, 9½x9½ inches; weight, 30 pounds. A very satisfactory outfit for educational and industrial laboratories in which tests or experiments must be conducted at temperatures below that of the room..... 18.00
- 7880. **ICE SHAVER** for shaving ice, coarse or fine, as may be desired; of tinned iron with removable steel cutter ..... .75

**IGNITION TUBES**, see **Combustion Tubes; Tubes.**



## THERMOMETERS

As with other types of calibrated and graduated measuring apparatus, there are many grades of thermometers, ranging from those with totally unspecified characteristics, to those certified by an official testing laboratory such as the German Reichsanstalt, the National Physical Laboratory of Great Britain and the U. S. Bureau of Standards. Certified thermometers are not intended to be used for routine work, but should be kept under lock and key and used only as reference standards for checking other thermometers. One or more certi-

fied thermometers should be found in every laboratory in which temperature is a matter of importance in connection with control of laboratory or plant processes. The temperature ranges should cover the maximum throughout which accurate work is to be done, and the fineness of the subdivisions should correspond to the finest divisions of any of the routine thermometers. To meet these requirements, more than one certified thermometer may be necessary and if so, they should be purchased.

No thermometer of any grade should, in our judgment, be permitted in a laboratory unless it satisfies the following *minimum* requirements:

- (1) Every thermometer should be made from special thermometer glass tubing, of one of the grades designated as thermometer, borosilicate, or normal glass.
- (2) The thermometer tubing must be properly aged to prevent shrinkage subsequent to calibration.
- (3) The mercury must be redistilled and free from grease, metals and oxides. Otherwise it will eventually become sluggish and cling to the sides of the tubing.
- (4) The thermometer must be calibrated or "pointed" at three points: near the bottom of the range, near the top and at about the middle.
- (5) The graduations of every thermometer must cover the full extent of the specified range.
- (6) The thermometer stem must not be less than 6 mm nor more than 7 mm in diameter, so that it will fit a rubber stopper.

In addition to these minimum requirements, there are others which we consider very desirable and which are met by every thermometer sold by us:

- (1) The mercury bulb must have sufficient mercury capacity. This is not a critical matter, but the cylindrical bulbs on the ordinary chemical thermometers should be at least 12 mm long. Smaller ones should be rejected as not being sufficiently sensitive.
- (2) The column above the mercury should be filled with an inert gas, preferably nitrogen or carbon dioxide. Washed air may be used in the less expensive ones. All thermometers for use above 200°C. must be filled with either nitrogen or carbon dioxide.
- (3) The graduations must extend a few degrees beyond the maximum or minimum temperature to be measured.
- (4) High range thermometers must not be graduated more than a few (about ten) degrees above the highest temperature at which they can be used without damage.
- (5) The better thermometers should, as a precaution against breakage, have a reservoir in the top to hold the excess of mercury forced up by accidental overheating. In such thermometers there is a tendency for the mercury to become separated and the reservoir to become filled. *Thermometers should not be rejected because the mercury column has become separated.* See directions below for reuniting the mercury thread.

### HOW TO REUNITE THE MERCURY THREAD

In shipment it is almost inevitable that the mercury thread in a thermometer should become separated. This is especially true with gas filled thermometers and with those having a reservoir in the top. Such thermometers should not be condemned as it is not difficult in most cases to reunite the

thread. Surface tension makes it practically impossible to jar the parts together or to make one part touch the other by heating the bulb. The following remedies will usually solve the difficulty and should be tried in the order in which they are given.

- (1) Immerse the bulb of the thermometer in a freezing mixture until all of the mercury has been drawn into the bulb by its contraction. Tap the thermometer to dislodge gas bubbles in the bulb. This treatment is usually effective and is not likely to result in breaking the thermometer.
- (2) If the thermometer has a reservoir in the top, either of the following methods may be used:
  - (A) If the capillary is fairly large, invert the thermometer and by jarring, start the mercury thread traveling down. Once started, it will usually flow until the reservoir is full. This causes the two parts to flow together in the reservoir. Turn the thermometer over and by jarring again, start the mercury traveling toward the bulb. Usually it will continue until the column stands at the normal height.
  - (B) Hold the thermometer at a considerable height over a low flame and by moving it back and forth, apply heat gently until the broken place in the thread has moved upward into the reservoir. Usually on cooling, the mercury will remain united. *Caution!* This method is more likely to result in breakage and extreme care should be used.
- (3) By holding the thermometer at arm's length in a horizontal position and rapidly (but not suddenly) swinging the arm down in a circular motion, centrifugal force may cause the upper part of the broken thread to unite with the lower. Be careful not to "snap" the arm when starting the motion as the thermometer may snap off.
- (4) If a proper centrifugal arrangement is available, the thermometer can be placed in it, bulb outward, and whirled. A simple arrangement for producing the same result is to tie a string in the ring at the top, start whirling slowly and gradually increase the speed. Be careful not to jerk the thermometer as the small ring may break off.
- (5) The above methods should be given several trials before admitting failure. The method to be described now is so likely to ruin the thermometer that it should be employed only as a last resort in preference to discarding the thermometer. Holding the thermometer in a slanting position with the bulb upward, very gently and cautiously heat the upper end of the detached part of the mercury thread, making sure that the glass is gently heated over a sufficient portion on each side to avoid breakage. **Be careful not to heat sufficiently to soften the glass.** If this is done carefully, the mercury can be distilled from the detached thread and may be driven upward to unite with the main portion of the mercury column.

Much information of interest will be found in various publications of the U. S. Bureau of Standards and the American Society for Testing Materials. The older editions of *Circular 8 of the U. S. Bureau of Standards, "Testing of Thermometers"*, contain a great deal of valuable and helpful information. The latest (1926 edition) omits much of the general

information on thermometers. The annual reports of Committee D-15 of the American Society for Testing Materials also contain much valuable information of special interest to chemists engaged in the testing of petroleum products, asphalt and similar materials. (See *A. S. T. M. Standards Adopted in 1925, D182-25, D183-25 and D184-25.*)



No. 13426



No. 13438B



No. 13444

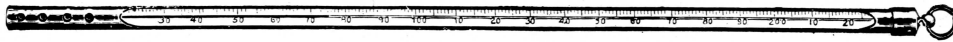
THERMOMETERS, ALL KINDS

THERMOMETERS FOR GENERAL USE

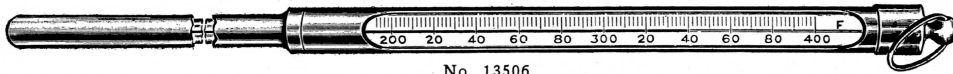
13426. THERMOMETERS, Centigrade, Solid Stem, Engraved Scale, for general use. Diameter of stem, 6 to 7 mm. Graduated in 1° divisions. Scaled for total immersion.
- |                        |            |          |          |          |          |
|------------------------|------------|----------|----------|----------|----------|
| No. ....               | B          | C        | D        | E        | F        |
| Range, degrees C. .... | -10 to 110 | 0 to 150 | 0 to 200 | 0 to 250 | 0 to 350 |
| Length, inches ....    | 12         | 12       | 14       | 14       | 16       |
| Each ....              | \$1.00     | 1.20     | 1.40     | 1.50     | 1.80     |
- 10% discount in lots of 12, 20% discount in lots of 144.
13428. THERMOMETERS, Fahrenheit, Solid Stem, Engraved Scale, same as No. 13426, but graduated in Fahrenheit scale, in 2° divisions. Scaled for total immersion.
- |                        |           |           |           |
|------------------------|-----------|-----------|-----------|
| No. ....               | A         | B         | C         |
| Range, degrees F. .... | 10 to 220 | 30 to 400 | 30 to 650 |
| Length, inches ....    | 12        | 14        | 16        |
| Each ....              | 1.00      | 1.40      | 1.80      |
- 10% discount in lots of 12, 20% discount in lots of 144.
13430. THERMOMETERS, Double Scale, Solid Stem, Engraved Scale, same as No. 13426, but with double scale. Scaled for total immersion.
- |                        |            |           |
|------------------------|------------|-----------|
| No. ....               | A          | B         |
| Range, degrees C. .... | -10 to 110 | 0 to 200  |
| Range, degrees F. .... | 10 to 220  | 30 to 400 |
| Each ....              | 1.25       | 1.60      |
- 10% discount in lots of 12, 20% discount in lots of 144.
13436. THERMOMETERS, Enclosed Milk Glass Scale, diameter 8 to 10 mm., with Centigrade scale. Scaled for total immersion.
- |                               |      |      |      |
|-------------------------------|------|------|------|
| No. ....                      | A    | B    | C    |
| Range, 0° to, degrees C. .... | 110  | 200  | 350  |
| Each ....                     | 1.25 | 1.50 | 2.25 |
- 10% discount in lots of 12, 20% discount in lots of 144.
13438. THERMOMETERS, Solid Stem, Engraved Scale, with Fractional Divisions, for general laboratory work where highest degree of precision is not required. With Centigrade scale. Diameter about 7 mm. Accuracy of Nos. B, C and D is within 0.4°; of F., within 0.8°C. Scaled for total immersion.
- |                                       |      |       |       |       |
|---------------------------------------|------|-------|-------|-------|
| No. ....                              | B    | C     | D     | F     |
| Range, degrees C. ....                | 0-50 | 0-100 | 0-100 | 0-200 |
| Size of subdivisions, degrees C. .... | 1/10 | 1/5   | 1/10  | 1/5   |
| Length, cm ....                       | 38   | 40    | 60    | 60    |
| Each ....                             | 3.50 | 4.25  | 6.00  | 7.00  |
13443. THERMOMETERS, Centigrade, High Range, Solid Stem, Engraved Scale, Filled with Nitrogen above the mercury. Accuracy about 1%. Scaled for total immersion. Diameter, about 7 mm. Caution: No. C must be used at temperatures above 450°C. only intermittently, and for very brief periods as the glass will soften at higher temperatures.
- |                                       |       |         |
|---------------------------------------|-------|---------|
| No. ....                              | A     | C       |
| Range, degrees, C. ....               | 0-360 | 100-500 |
| Size of subdivisions, degrees C. .... | 1     | 2       |
| Length, cm ....                       | 40    | 40      |
| Each ....                             | 3.00  | 5.00    |
13444. THERMOMETERS, Fahrenheit, High Range, same as No. 13443, but graduated in Fahrenheit scale. No. B must be used only intermittently and for brief periods above 750°, as the glass will soften at higher temperatures.
- |                                       |         |         |
|---------------------------------------|---------|---------|
| No. ....                              | A       | B       |
| Range, degrees F. ....                | 200-750 | 200-900 |
| Size of subdivisions, degrees F. .... | 5       | 5       |
| Length, cm ....                       | 40      | 40      |
| Each ....                             | 3.00    | 5.00    |
13454. THERMOMETER, Low Range, Solid Stem, Engraved Scale, Alcohol Filled, for low temperatures. Range, -50° to + 50° C., in 1/5° divisions. Length, about 30 cm.; diameter, about 8 mm. .... 4.00
13456. THERMOMETER, Low Range, Solid Stem, Engraved Scale, Pentane Filled, for very low temperatures. Range, -200° to + 50° C., in 1° divisions. Length, about 35 cm.; diameter, about 10 mm ..... 10.00
13458. THERMOMETER, Low Range, Solid Stem, Engraved Scale, Toluol Filled, for low temperatures. Range, -100° to + 50° C., in 1° divisions. Length, about 30 cm. .... 7.00



No. 13464



No. 13496



No. 13506

**THERMOMETERS, NORMAL OR PRECISION**

13464. **THERMOMETERS, Normal or Precision, Solid Stem, Engraved Scale**, for precision measurements where highest accuracy is essential. Thermometers reading above 250°C. are filled with nitrogen. Graduated according to the requirements of the United States Bureau of Standards. **Without certificate. Scaled for total immersion.**

No.	A	B	C	D	E	F
Range, degrees C.....	-10 to 50	-10 to 100	-5 to 105	0 to 105	0 to 250	0 to 300
Size of subdivisions, degrees C	1/10	1	1/5	1/10	1/2	1
Length, about, cm.....	38	30	38	60	45	45
Each .....	\$6.00	4.00	7.00	10.00	4.50	4.50

13465. **THERMOMETERS, Normal or Precision**, same as No. 13464, but standardized by the United States Bureau of Standards, **with certificate.**

No.	A	B	C	D	E	F
Each .....	12.50	8.00	12.50	18.00	10.00	9.75

13486. **THERMOMETER, Titer Test, Solid Stem, Engraved Scale**, according to the requirements of the Association of Official Agricultural Chemists. Range, 10° to 65° C., in 1/10° divisions with zero point marked, and with reservoirs at upper end and between 0° and 10° marks. Length of thermometer, 38 cm.; length of bulb, 3 cm.; distance between top of bulb and 10° mark, 3 to 4 cm.; diameter of stem and bulb, about 6 mm. **Scaled for total immersion.** (See *Journal of the Association of Official Agricultural Chemists*, Vol. 2, No. 3, Part II, November 15, 1916, page 302; *Journal of Industrial and Engineering Chemistry*, Vol. 10, No. 4, for April 1918, page 317)..... **5.50**

**THERMOMETERS FOR SPECIAL USES**

13492. **THERMOMETERS, Anschutz, Precision**, a set of seven thermometers covering the range from -10° to 360° C., in velvet lined case with hinged cover and fasteners. Each thermometer is made with a fine capillary with reservoir at the top sealed in a glass tube with engraved milk-glass scale sealed permanently in place. The top is knobbed for convenience in handling and suspending. Each thermometer covers a range of 60° to 70° C., overlapping by a few degrees the ranges of those on either side. Graduations are to 0.2° C. Length of thermometers, 15.5 cm. (6 1/8 inches); diameter, about 6 to 7 mm. (1/4 inch). This is an excellent set for use as secondary standards in a chemical laboratory and is particularly useful in organic chemistry. Complete as described with thermometers reading -10° to 60° C., 40° to 100° C., 90° to 160° C., 150° to 210° C., 200° to 260° C., 250° to 310° C., 300° to 360° C., in velvet lined case 18x18 cm. **Per set 36.00**

13493. **THERMOMETERS, Anschutz, Precision**, same as No. 13492, but sold separately for replacement in broken sets.

No.	A	B	C	D	E	F	G
Range, deg. C....	-10 to 60	40 to 100	90 to 160	150 to 210	200 to 260	250 to 310	300 to 360
Each .....	4.50	4.50	4.50	4.50	6.00	6.00	6.00

13496. **THERMOMETERS, Armored, Solid Stem, Engraved Scale**, with armor of seamless steel tubing, nickel-plated, with lower end perforated around bulb to permit circulation. Thermometer is suspended from screw cap and easily removed. **Scaled for 3 inch immersion. Caution:** No. E must be used at temperatures above 750° F. only intermittently and for very brief periods as the glass will soften at higher temperatures.

No.	A	B	D	E
Range, degrees F.....	0-220	30-400	30-750	100-900
Size of subdivisions, degrees F.....	2	2	2	5
Length, inches.....	12	14	16	16
Each .....	4.00	4.50	6.00	10.00

13497. **Thermometers, extra**, for replacement in No. 13496.

No.	A	B	D	E
Each .....	2.00	3.00	3.75	7.75

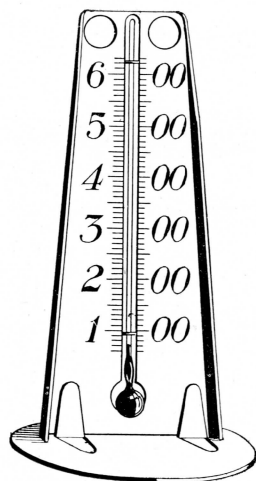
13506. **THERMOMETERS, Armored, Asphalt, with Protected Bulb**, and engraved stem. The bulb is immersed in a bath of mercury contained in the long slender steel cup forming the stem, affording protection and making it almost as quick reading as a bare glass bulb. Length of case, 10 inches. **Scaled for immersion.**

No.	A	B
Range, degrees F.....	200-400	200-650
Size of subdivisions, degrees F.....	2	5
Each .....	6.00	7.50

13507. **Thermometers, extra**, for replacement in No. 13506.

No.	A	B
Each .....	3.00	4.50

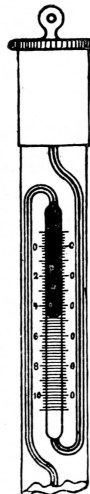
13512. **THERMOMETER, Asphalt Drying Oven, Solid Stem, Engraved Scale**, graduated from 150° to 175°C. in 1° divisions, for determining the loss on heating of asphaltic compounds. Length, about 6 inches. **Scaled for total immersion.** (See *A. S. T. M. Standards for 1924, No. D6-20*)..... **4.75**



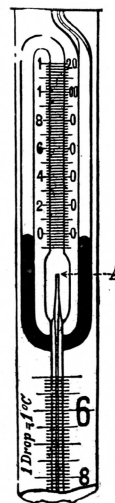
No. 13514



Nos. 13518-9



Nos. 13518-9  
(Auxiliary Scale)



No. 13522  
(Showing Method of  
Adjusting Temperature)

13514. **THERMOMETER, Bake Oven, Medium Grade**, consisting of a glass tube, mercury-filled, mounted on 5-inch flanged metal scale with sand blast finish and white figures. With round removable base with asbestos mat attached. Range, about 100° to 600° F. . . . . \$2.00

**THERMOMETER, Beckmann**, for the exact determination of slight changes in temperature. Widely used in calorimetry and in boiling and freezing point determinations. Consists of a capillary of normal glass graduated to 1/100 degree over a range of 5° or 6° C., with an auxiliary scale at the top graduated from -10° to 120° C., in 2° divisions, sealed in a glass jacket with metal cap. The thermometer may be set to read at any temperature between -10° and 120° C. Constructed and graduated according to the requirements of the United States Bureau of Standards.

13518. Without certificate . . . . . 18.00

13519. With Bureau of Standards certificate. . . . . 30.00

**THERMOMETER, Beckmann, improved**, similar to No. 13518, but with improved method of adjustment of temperature. In the reservoir beneath the auxiliary scale is a short capillary (A), the opening of which is adjusted to deliver a drop of mercury of sufficient size to produce a fixed change of temperature in degrees C., the exact amount of this change being engraved on the scale of the thermometer. This improved construction obviates the necessity of tapping the mercury column, with the consequent danger of breakage. It also makes easier the return of excess mercury from the reservoir to the bulb which takes place automatically if the thermometer is held in a perpendicular position. Mercury from the reservoir may be transferred to the side arms by merely inclining the thermometer. Graduated according to the requirements of the United States Bureau of Standards.

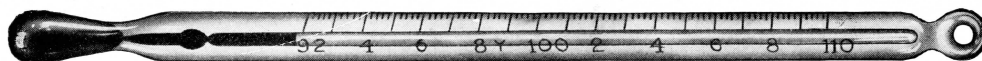
13522. Without certificate . . . . . 20.00

13523. With Bureau of Standards certificate. . . . . 35.00

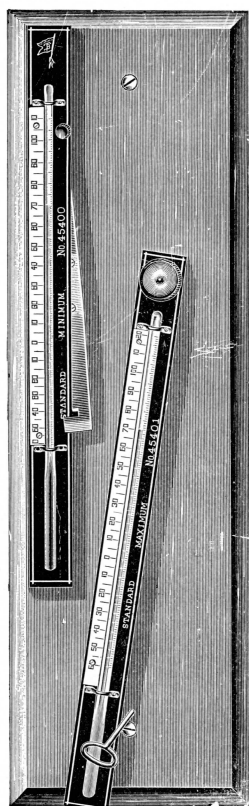
13533. **THERMOMETERS, Calorimeter, Solid Stem, Engraved Scale**, as used with Parr Calorimeters. Graduated to meet the requirements of the United States Bureau of Standards. **With Bureau of Standards Certificate. Scaled for total immersion.**

No. . . . .	A	B
Range, degrees F. . . . .	65 to 90	65 to 105
Size of subdivisions, degrees F. . . . .	1/20	1/20
Each . . . . .	12.00	15.00

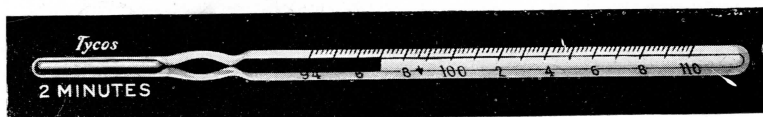
13540. **THERMOMETER, Gas Calorimeter, Solid Stem, Engraved Scale**, high grade. Graduated from 30° to 110° F., in 1/10° divisions. Length, about 18 inches (45 cm). The range is sufficient to adapt this to the measurement of both outlet and inlet temperatures. **Scaled for total immersion** . . . . . 12.00



No. 13548



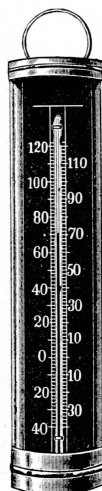
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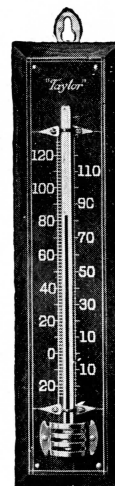
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No. 13560

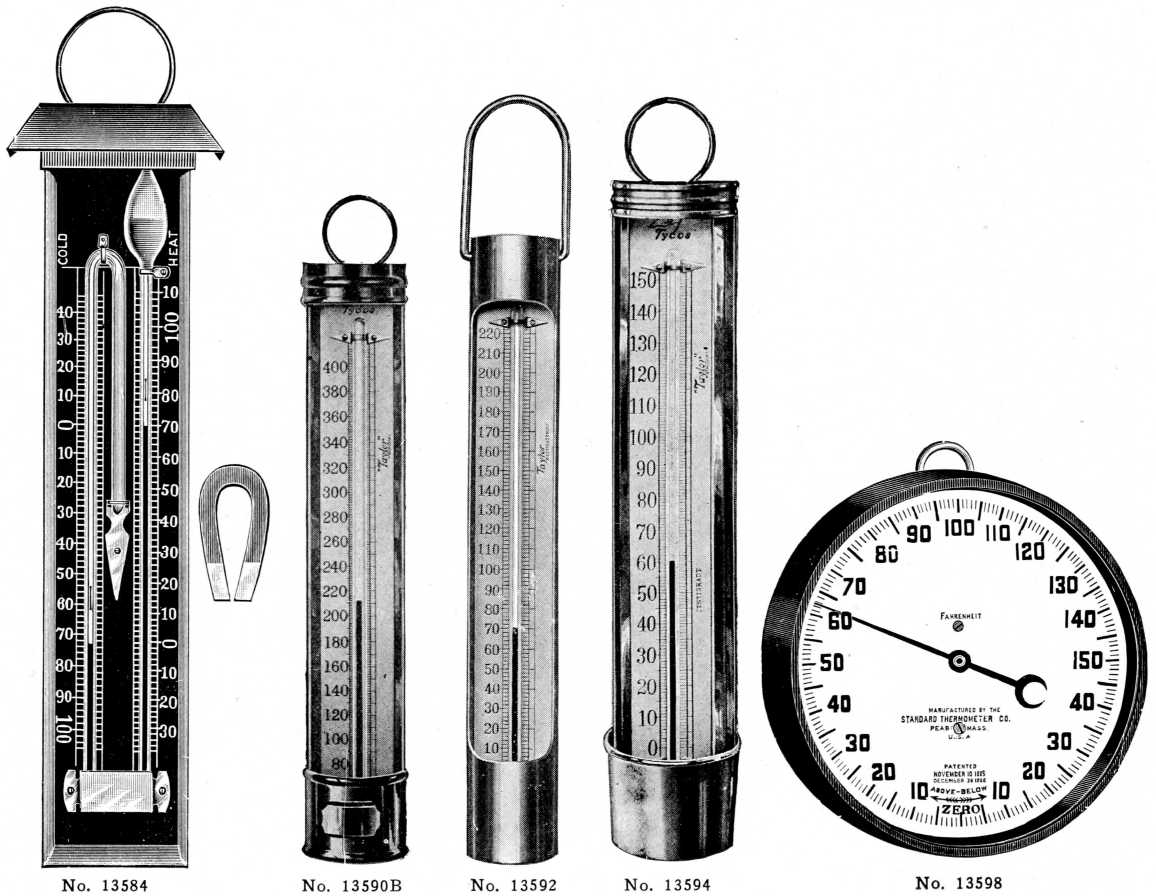


No. 13562



No. 13564

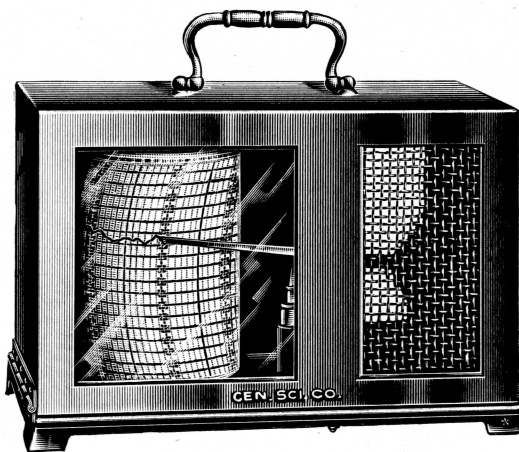
- 13546. THERMOMETER, Clinical, One Minute, first grade, with magnifying tube, in hard rubber case with factory certificate..... \$1.25
- 13548. THERMOMETER, Clinical, Veterinary, first grade, pear-shaped bulb, ring top, with magnifying tube, in hard rubber case, with factory certificate ..... 1.80
- THERMOMETERS, Dairy, see Milk Testing Apparatus.
- 13560. THERMOMETER, Floating, Wood Frame. Floats horizontally in liquids. No metal to corrode. Length, 12 inches; range, about 0° to 220° F ..... 1.50
- 13562. THERMOMETER, Household, standard grade, 10 inch, heavy japanned 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 ..... 1.25  
Note: For WINDOW THERMOMETER, see page 661.
- 13568. THERMOMETER, Incubator, with enlargement in stem to prevent slipping through hole in stopper. Length, about 20 cm. Distance from bottom of bulb to enlargement, 4½ inches. Range, 0° to 50° C., in 1° divisions..... 2.50
- 13569. THERMOMETER, Incubator, Enclosed Milk Glass Scale, graduated from 0° to 70°C. in 1° divisions. Length, about 22 inches, with zero point of scale 12 inches from bulb..... 4.50
- 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..... 18.00
- 13579. Thermometer, Maximum, only for No. 13578. With manufacturer's certificate..... 8.00
- 13580. Thermometer, Minimum, only for No. 13578. With manufacturer's certificate..... 8.00



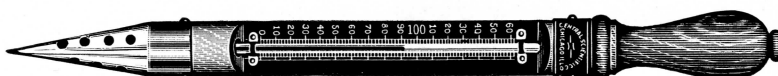
- 13584. **THERMOMETER, Maximum and Minimum Registering, Six's Pattern, in japanned tin case with metal scale.** Length, 8 inches (20 cm); approximate range,  $-20^{\circ}$  to  $120^{\circ}$ F. Complete with horseshoe magnet for resetting..... \$7.00
- 13586. **THERMOMETER, Melting Point of Bituminous Materials, A. S. T. M. Low S. P.,** solid stem, engraved scale, graduated from  $-2^{\circ}$  to  $80^{\circ}$ C. in  $1/5^{\circ}$  divisions. Scaled for total immersion. Length, 15 inches (38 cm). (See *A. S. T. M. Standards Adopted in 1926, No. D36-26.*) ..... 7.00
- 13587. **THERMOMETER, Melting Point of Bituminous Materials, A. S. T. M. High S. P.,** same as No. 13586 but graduated from  $30^{\circ}$  to  $160^{\circ}$ C. in  $1/2^{\circ}$  divisions. Length, 15 inches (38 cm).... 4.00
- 13590B. **THERMOMETER, Metal Scale, highest grade, with scale of oxidized brass in black japanned tin case.** Range  $30^{\circ}$  to  $220^{\circ}$ F. Length, 12 inches (30.5 cm)..... 2.00
- 13592. **THERMOMETER, Metal Scale, with Copper Cup, Highest Grade,** for determining the average temperature of oil or other liquids in tank cars or tanks and securing a sample at the same time. Range,  $10^{\circ}$  to  $220^{\circ}$ F. Length, 12 inches (30.5 cm)..... 3.90
- 13594. **THERMOMETER, Metal Scale, Sugar Factory,** standard grade, with magnifying tube filled with mercury, silvered brass scale with black figures, and brass screw clamps. Bottom of copper case is closed to permit samples to be taken. Length, 12 inches (30.5 cm). Range, about  $0^{\circ}$  to  $150^{\circ}$  Centigrade ..... 4.25
- THERMOMETERS, Metal Frame, Straight and Angle Stem,** for steam boilers, water heaters, oil stills, etc. Send for special bulletin.
- 13598. **THERMOMETER, Metallic, Demonstration Form,** with glass back to show the internal mechanism, which consists of a strip of two metals soldered together and connected with an index hand by a multiplying lever. Diameter 6 inches (15.2 cm). Range,  $-50$  to  $150$  degrees F..... 4.25



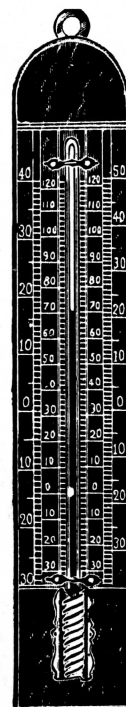
No. 13712A



No. 13676



No. 13710



No. 13716

13676. **THERMOMETER, Recording, Thermograph**, an 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.

The mechanism consists of a bimetallic coil of non-rusting material, exposed to the atmosphere at the end of the case, connected to the recording pen. As the temperature rises and falls, the coil unwinds and winds up, causing the arm to move vertically across the chart. The movement is extremely sensitive and having no levers in its construction, is very rigid. The charts are divided vertically into days and into two hour subdivisions of a day, and horizontally into degrees. The outfit is mounted in a non-corrosive metal case with glass front and screened openings about the movement and with storage space for charts. Dimensions: length of case, 10 1/4 inches (26 cm.); height, 6 3/8 inches (16.2 cm.); width, 5 inches (13.7 cm.); weight, about 7 pounds; range of temperature, 0° to 100° F. in 2° divisions. The case is nicely finished in gray enamel.

Complete with charts for one year, pen and ink and full directions for use.....\$55.00

13681. **Thermograph Charts**, 0° to 100° F., for use with No. 13676. 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.

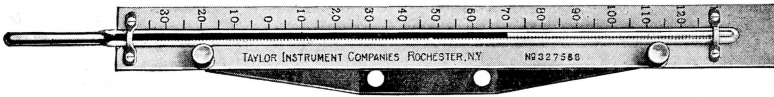
920. **Ink, Purple**, for thermographs.....Per bottle .55

13710. **THERMOMETER, Soil, Standard Grade**, magnifying tube, mercury-filled, mounted on 15 inch turned mahogany frame with oxidized brass scale, and with pointed metal end. Range, 30° to 180° F. .... 3.00

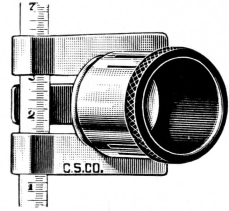
13712A. **THERMOMETERS, Soil, as Used by the New York Agricultural Experiment Station**. With solid stem engraved scale thermometer mounted in turned wood case with upper part cut away to expose the scale from about 20° to 120° F. Both ends are protected by metal ferrules. For use at a depth of 12 inches..... 11.00

13716. **THERMOMETER, Three Scale**, boxwood, F., R. and C. scales, for use in showing relation of freezing and melting points on the three scales ..... .75

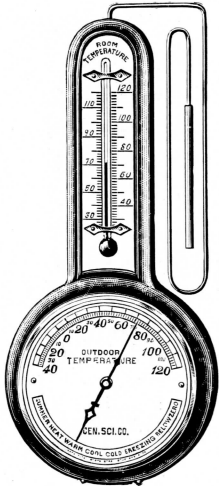
13718. **THERMOMETER, A. S. T. M. Turpentine Distillation**, solid stem, engraved scale, graduated from 145° to 200° C. in 1/5° divisions. Scaled for total immersion. Length, about 6 inches (15 cm). (See *American Society for Testing Materials Standards for 1924, No. D13-24*).... 5.50



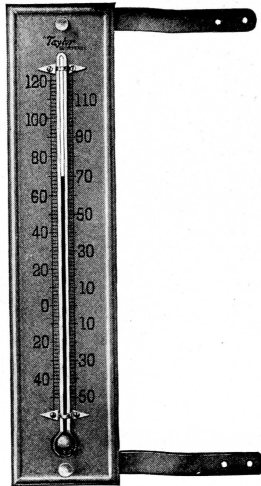
No. 13720



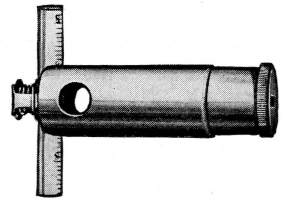
No. 1984



No. 13722



No. 13724



No. 13730

13720. **THERMOMETER, Weather Bureau Standard**, 12 inch, cylindrical bulb, with graduations etched on the tube. The tube is mounted on an aluminum scale on which is marked every 5 degree line of the scale with figures every 10 degrees. The thermometer with aluminum scale is mounted on a brass insulating support from which it is readily removed, by means of thumb screws. The brass support has two holes punched in it for screwing to the wall or other support. Approximate range,  $-30^{\circ}$  to  $120^{\circ}$  F. With manufacturer's certificate ..... \$8.00
13722. **THERMOMETER, Weather, Outdoor and Indoor Combined**, for use in laboratories, class rooms and homes for obtaining at a glance both inside and outside temperatures. It will also be found very convenient for comparing temperatures inside and outside an incubator, incubating room, hot house, or in two parts of the same enclosure.
- The thermometer consists of an ordinary glass thermometer of good grade with colored liquid, mounted on the front of a metal case at the bottom of which is an indicating dial with a needle attached actuated through a spring by the expansion and contraction of a fluid in a closed metal tube. The end of the tube is attached to an elongated bulb which is to be located outside the window, in an incubator or wherever it is desired to measure the temperature.
- Length of thermometer mounting, 11 inches; diameter of dial, 4 inches; length of capillary tube, 15 feet; weight of outfit, 2 pounds; range of glass thermometer,  $30^{\circ}$  to  $120^{\circ}$  F.; of outside thermometer,  $-40^{\circ}$  to  $120^{\circ}$  F.
- Complete with directions for use..... 18.00
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,  $-40^{\circ}$  to  $120^{\circ}$  F..... 1.00
13730. **THERMOMETER READING ATTACHMENT**, designed especially for use with Calorimeter Thermometer. Supported by the thermometer stem, thereby maintaining a constant angle of vision over the whole scale..... 2.25
1984. **THERMOMETER READING ATTACHMENT**, consisting of a nickel-plated brass clamp to fasten on the thermometer stem, with an adjustable eyepiece ..... 3.00