# PHYSICAL *and* CHEMICAL APPARATUS

MANUFACTURED AND IMPORTED BY


## CENTRAL SCIENTIFIC CO.,

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**Incorporated** 1900


## CATALOGUE M

# Meteorological Instruments

## BAROMETERS.

### Mercurial vs. Aneroid Barometers.

Reasons for selecting a high grade Aneroid Barometer (No. 1212B) in preference to a Mercurial Barometer.

1. The Aneroid Barometer is less liable to have its parts thrown out of adjustment because of rough handling by the transportation companies, which will not entertain claims for damages on account of breakage, and will not, for any consideration, insure or guarantee safe delivery.

2. It is more sensitive to changes of atmospheric pressure than the mercurial column, as it has no inertia or capillary attraction to overcome.

3. No vernier is required in taking a reading as is the case with a mercurial barometer, and the error due to personal equation is minimized. The scale divisions are 0.02 of an inch, and can be read within 0.01 of an inch. A reading can be made instantly without loss of time in adjusting zero point and vernier.

4. The movement of the aneroid is compensated for temperature, and no reference has to be made to a temperature correction table as in taking readings with a mercurial barometer.

5. On account of its portability the aneroid barometer can be carried in perfect safety to the nearest Weather Bureau station for checking and correction.

6. All of the parts of No. 1212B Aneroid Barometer are selected and made by hand by the oldest barometer makers in the world, Short & Mason, London, England, who are makers of barometers for the British government. It has been adopted by the United States Navy, and is used by the Weather Bureau in Washington for checking instruments.

7. Even if a mercurial barometer is not broken in transportation, it is so easily put out of order by rough handling, that it is impossible to tell after it reaches its destination whether the readings taken are standard or not, unless the instrument is checked on the spot by an official of the United States Weather Bureau.

8. A slight disarrangement of the zero pointer, or a strain of the parts, or the least amount of air in the tube due to rough handling by transportation companies, may cause an error of reading of $\frac{1}{10}$ of an inch or more.

9. Unless the cistern and the mercury contained therein are occasionally cleaned and freed from dirt, the air will not pass in and out of the cistern freely and an error of as much as $\frac{3}{10}$ of an inch may result from the pressure within the cistern.

10. In making a reading of a mercury column an error due to personal equation of as much as .03 to .04 of an inch may be made in adjusting the zero point.

11. Aneroids are displacing mercurial barometers in Germany, France and England.

12. Last, but not least, the cost of No. 1212B Aneroid Barometer is less than that of any mercurial barometer which could be recommended.

1151. **Barometer Tubing**, heavy, large bore, per meter... $0.18

1153. **Barometer Tube**, large bore, thick walled, one end sealed, 80 cm. long.. .28

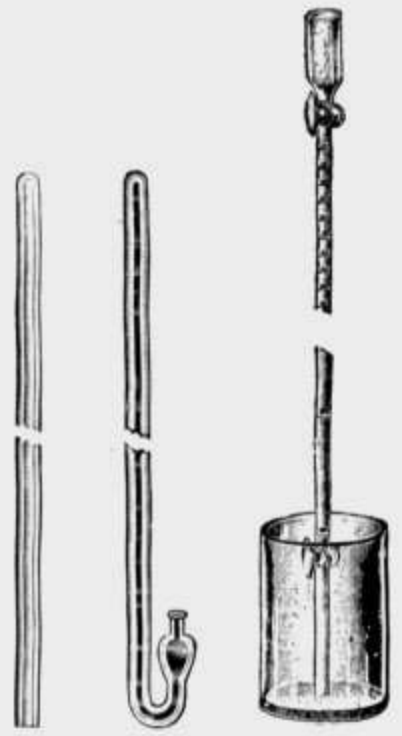
1155. **Barometer Tube**, complete with glass cup and pipette for filling..... .40

1157. **Barometer Tube**, with bend and bulb ..... .40

1159. **Barometer Tube**, demonstration form, with funnel top and with stop cocks at top and bottom for easy filling and emptying of the tube. Graduated ..... 7.50

1161. **Barometer Tube**, same as No. 1153, graduated in millimeters ..... 2.00

1162. **Mercury Well** of japanned iron. Capacity about 50 c.c. ..... .22



No. 1153. No. 1157. No. 1159.

No. 1161.

## IMPROVED MERCURIAL BAROMETERS. FORTIN PRINCIPLE. Patented Nov. 28, 1905.

A BAROMETER without provision for the adjustment of the mercury level (zero point) is of no practical value in scientific work. For this reason we have ceased to carry the "old line" instruments.

These new BAROMETERS embody all of the important features and operate on the same principle as the U. S. Weather Bureau Standard Barometers. (See also page 99.)

The GLASS TUBE is straight and of heavy wall and uniform bore.

The MERCURY CISTERN (C) is constructed of glass, sealed to the tube. A flexible and air-tight piece of leather forms the lower part of the cistern, and by means of the adjustment screw (B) the mercury level can be raised or lowered to coincide with the zero point. This zero point consists of a piece of colored glass (A) drawn to a point, and extending from the outer wall of the tube. This form is far superior to the "line" zero used on most low cost barometers.

The HEIGHT of the MERCURY COLUMN is observed by means of a special device attached to the vernier.

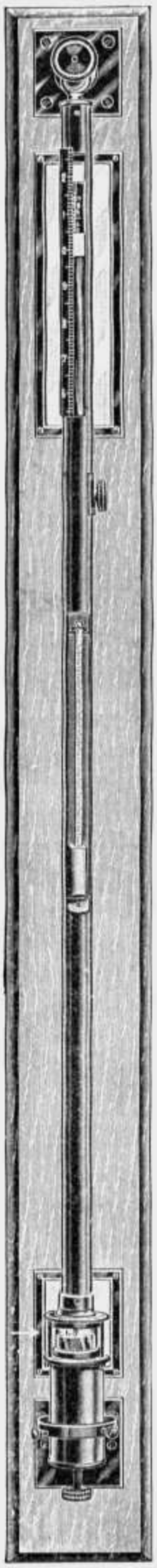
The BAROMETER SCALE is fixed to the board, and is graduated in Metric and English, reading by means of a vernier to $\frac{1}{10}$ mm. and 1-200 inch. The vernier slides in an accurately cut slot and moves freely and independently of the glass tube. The vernier graduations are placed on a beveled surface, bringing them close to the scale. A lens front thermometer with Centigrade and Fahrenheit scale is attached to the mounting.

1165. **Improved Mercurial Barometer.** The scale reads down to 25 inches, and is therefore not satisfactory for altitudes above 4,000 feet. See No. 1165A for a high altitude barometer. Complete with thermometer .....Net $ 15.00

1165A. **Improved Mercurial Barometer.** Same as No. 1165, but with a scale reading down to 20 inches for use in high altitudes.....Net 17.00

1166. **Improved Mercurial Barometer.** Same as No. 1165, with addition of rack and pinion adjustment for the vernier and a certificate of error. For altitudes below 4,000 feet only.....Net 20.00


No. 1165.



Nos. 1169-71.

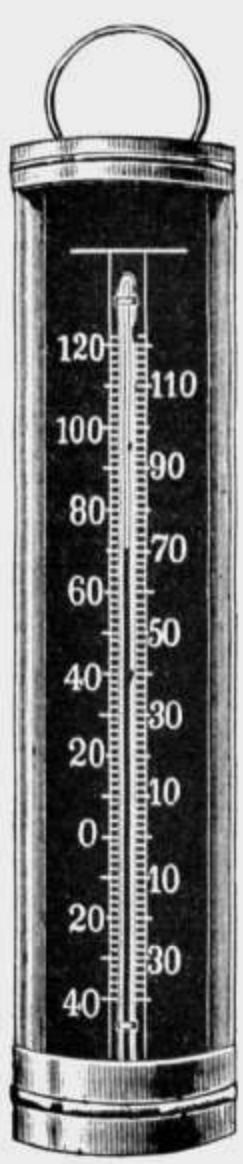
1169. **Standard Barometer, United States Weather Bureau Type,** Fortin Principle. This barometer is of the highest type of excellence, indorsed by the United States Weather Bureau and fully warranted by the manufacturer. (See also page 99.) The mercury tube is inclosed in a brass body with gun-metal 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-thousandth 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. The barometer may be used without the board by suspending it by the ring at the top; but the board (No. 1171), as shown in the illustration, possesses many advantages. Without board.....Net $40.00

1171. **Back** for above, 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.....Net $5.50

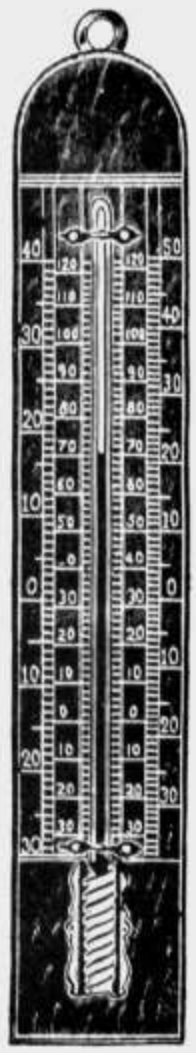
1175. **House Thermometer,** standard grade, 10 inch, heavy japanned tin case, accurately tested.....$1.10

1177. **House Thermometer,** 8 inch, metal scale, oak back, beveled edge, with brass guard over bulb.....$0.67

1179. **Three Scale Thermometer,** boxwood, F., R. and C. scales $0.67




No. 1175.



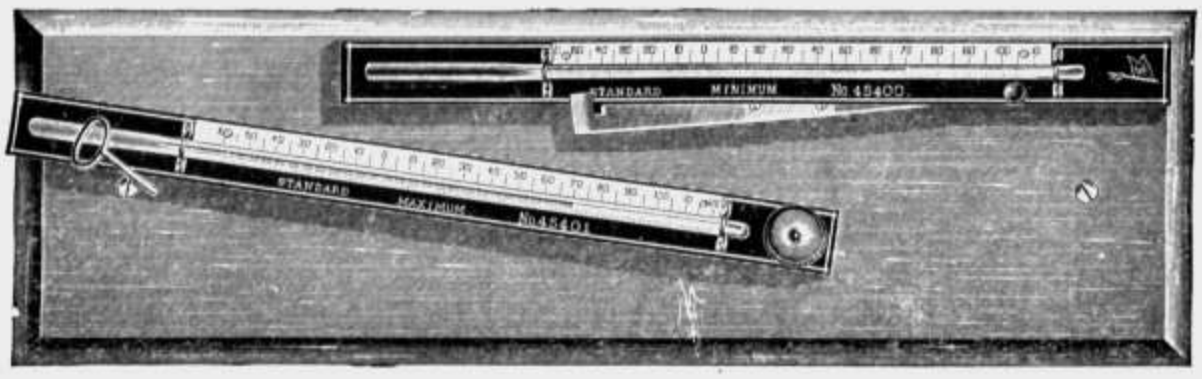
No. 1179.


**No. 1185.**

1181. **Standard Thermometer,** 12-inch, latest Weather Bureau pattern, cylindrical bulb, graduation etched on tube, with raised metal strip at side of the tube on which are marked the figures and every fifth line of the scale. Furnished with support and binding screws. Certificate with each thermometer..... $ 5.55

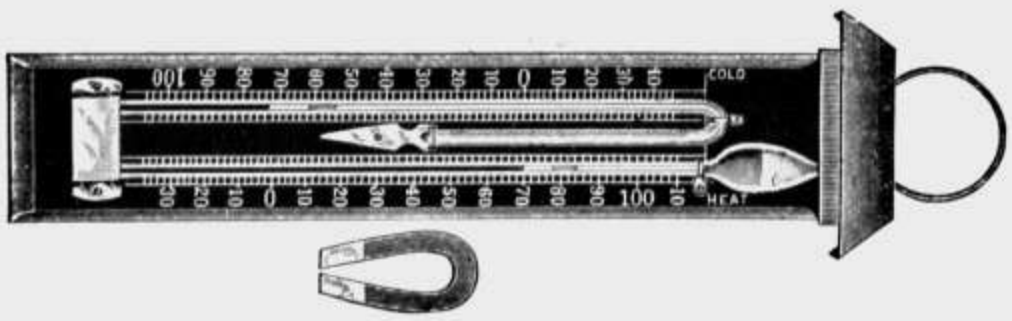
1183. **Standard Minimum Registering Thermometer,** same pattern and description as No. 1181. Certified..... 6.10

1185. **Standard Maximum Registering Thermometer,** same pattern and description as No. 1181. Certified..... 6.65




**No. 1189.**

1189. **U. S. Weather Bureau Set of Maximum and Minimum Registering Thermometers,** latest pattern, consisting of Nos. 1183 and 1185 Thermometers mounted on polished oil finished back. Furnished with certificates for each thermometer. Per set..... 12.00




**No. 1190.**

1190. **Six's Self-Registering Maximum and Minimum Thermometer.** Eight-inch black japanned tin case, silvered metal scale, with magnet ..... 3.35

9159. **Soil Thermometer,** for ascertaining the temperature of the soil at various depths. Thermometer set in oak with steel point. Scale engraved on stem. Range from — 4° to 120° Fahrenheit, by ⅕° divisions. Supplied for use at four different maximum depths.

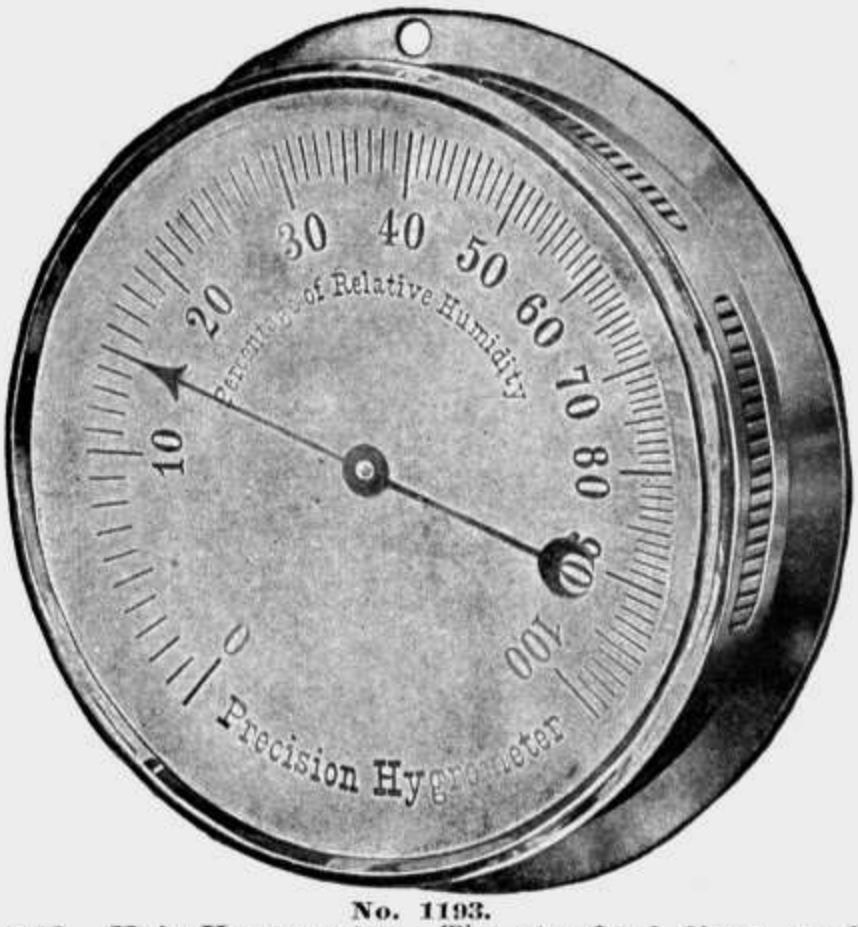
| | | | | |
|---|---|---|---|---|
| Depth, cm. ..... | 25 | 50 | 75 | 100 |
| Depth, inches, approx..... | 10 | 20 | 30 | 40 |
| Price ..... | 5.50 | 6.65 | 7.75 | 9.00 |

1191. **Soil Thermometer,** 10-inch glass cylindrical thermometer, with paper scale, in turned wood case with brass pointed bottom 1.40

9161. **Soil Thermometer,** standard grade, 10-inch glass cylindrical thermometer, with metal scale, mounted on turned wood frame with brass pointed bottom..... 2.50

**For Chemical Thermometers,** see list of Chemical Apparatus.

**No. 1191.**

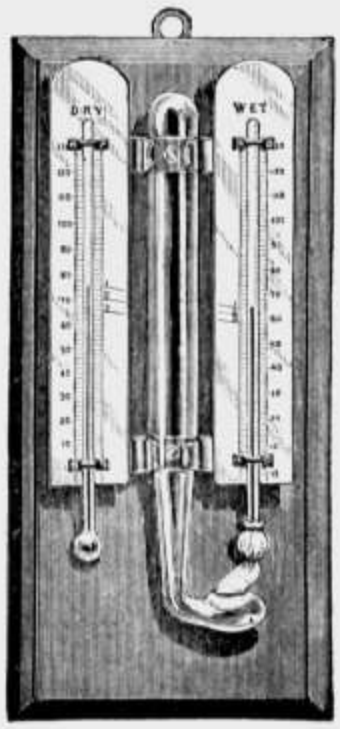



No. 1193.

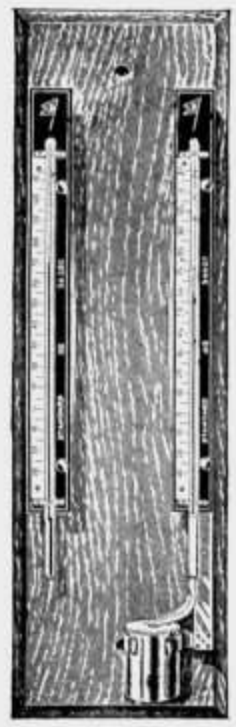

No. 1194.

1193. **Hair Hygrometer.** The standard direct reading Hygrometer. 5 inch enameled card dial showing relative humidity..... $ 8.35

1194. **Hair Hygrometer.** Scale denotes the humidity of the air without reference to tables. In spun brass nickel plated case, 3 inch dial.. 2.00




No. 1195.



No. 1199.

1195. **Mason's Hygrometer,** with lines drawn on the scale for convenience in maintaining a humidity of 50% at normal temperatures, mounted on polished hardwood frame, 8½x4½ inches, scale raised from frame by insulating strips, complete with glass cistern and tables for determining dew point and humidity..... 5.00

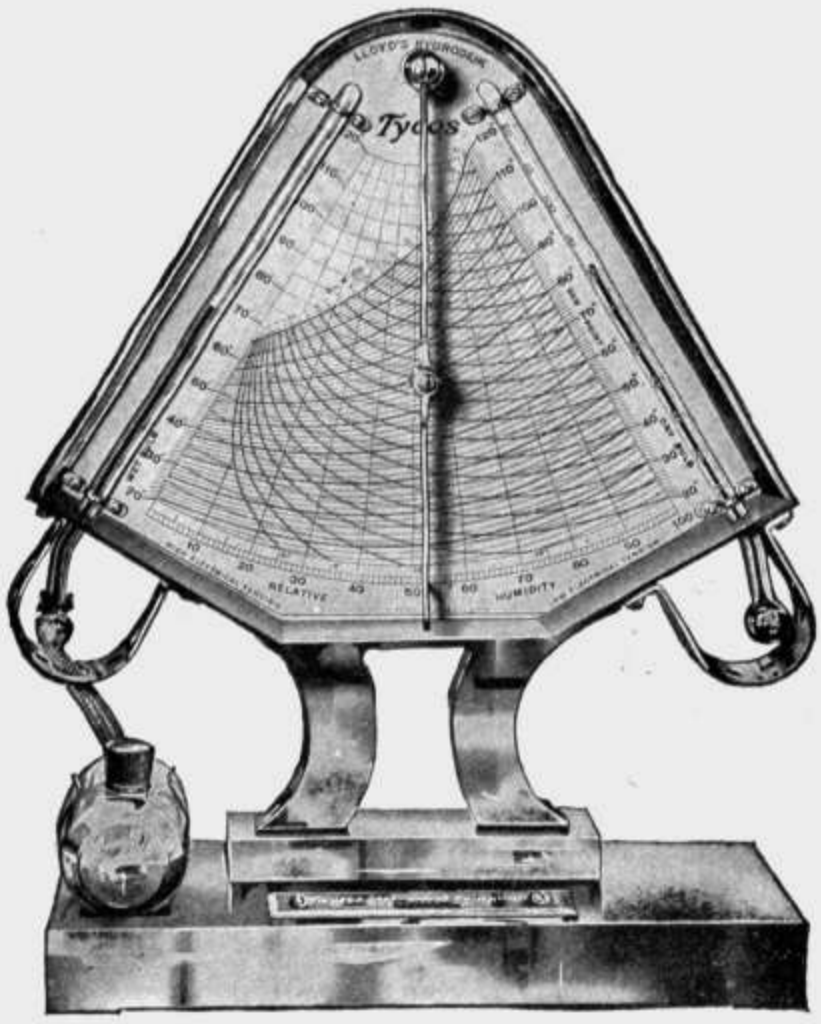
1195A. **Cistern,** only, for No. 1195..... .33

1197. **Mason's Hygrometer,** simpler form, thermometers not raised, mounted on polished hardwood frame..... 2.50

1197A. **Cistern,** only, for No. 1197..... .33

1199. **U. S. Weather Bureau Hygrometer,** consisting of two No. 1181 Standard Thermometers mounted on a finely polished hardwood back, metal cistern with wick, and certificate for each thermometer..... 12.00

1200. **Silk Wicks** for Hygrometers.....Each .17

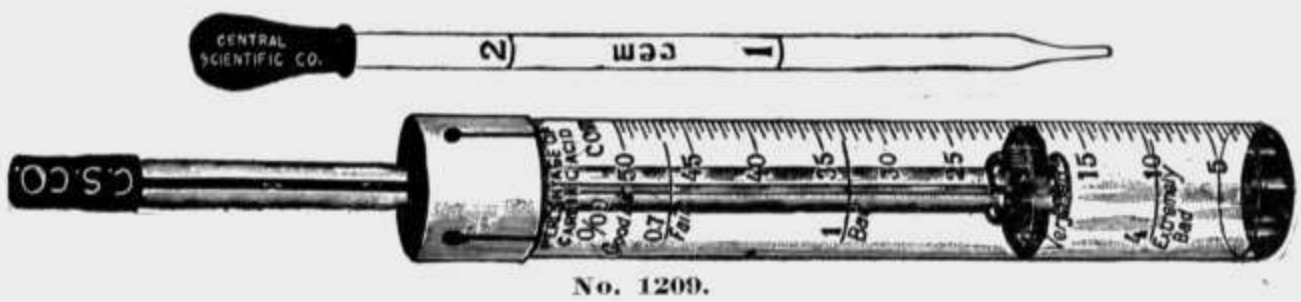



**No. 1203.**

1203. **Hygrodeik,** an improved form of the Mason's 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 100 degrees Fahrenheit. Full directions furnished with each instrument ..... $ 10.00


**No. 1206.**

1206. **"Sling" Psychrometer** or **Hygrometer,** 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..... 5.00




**No. 1209.**

1209. **Wolpert's Air Tester (Carbacidometer),** for obtaining the amount of carbonic acid gas in a room by direct readings from the graduations etched on the glass, thus doing away with all computations and tables as in the old forms. Another advantage of this form is that the air of a room may be secretly tested, if desired. Directions and full set of capsules for making test solutions furnished with each instrument ..... 3.75

1209A. **Extra Capsules** for No. 1209. Per dozen capsules (six of each reagent) .....Net 1.00

No. 1210.

1210. **Aneroid Barometer, Demonstration Form.** This is a very desirable and useful instrument which should be in every laboratory. 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 to hang up in the schoolroom for daily barometric observations..... $ 13.35


No. 1211.

1211. **Aneroid Barometer.** Sea Level Reading Type, with rearranged Weather Marks. This instrument is arranged in such a manner that it is 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.

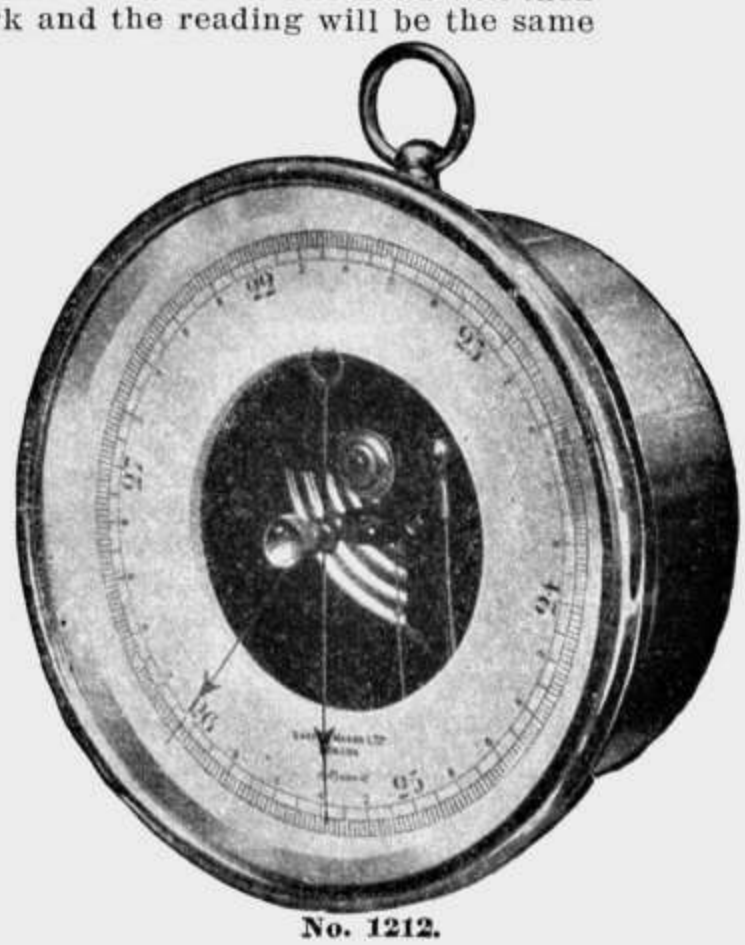
To adjust the barometer for altitude for a given city, town or location, turn the brass plate set in the back of the case (this is easily done with the fingers) until the number of feet corresponding to the elevation of the city or town is opposite the arrow. The hand will then point to the proper weather mark and the reading will be the same as that of the U. S. Weather Bureau, which is Sea Level Reading.

Spun brass case, porcelain dial, 5 inches in diameter; adjustable stationary hand for marking the last position of the movable hand ..... 11.00

1211A. **Aneroid Barometer.** Same as No. 1211, but with metal silvered dial and first quality compensated movement ..... 16.65

1212. **Aneroid Barometer,** for use in altitudes between 4,900 and 9,500 feet. 5 inch brass case, open porcelain dial, visible works... 10.30

1212A. **Aneroid Barometer.** Same as No. 1212, but for altitudes between 2,900 and 7,100 feet.. 10.30



No. 1212.


No. 1212B.


No. 1213.

1212B. **Aneroid Barometer,** as adopted by the United States Navy. A brass case barometer of extra quality, with specially finished movement compensated for temperature, and silvered open metal dial graduated to 0.02 inches. For altitudes up to 3,500 feet. The best barometer of this style on the market..... $ 16.65

1213. **Aneroid Barometer,** 4 inches in diameter. The mechanism is mounted in a highly polished copper case and is in full view. The graduations read in both English and metric systems. For altitudes up to 3,000 feet..... 6.65

1214. **Aneroid Barometer,** 4 inch card dial, open face, nickel plated case. Graduations in both English and metric systems. For altitudes up to 3,000 feet ..... 3.00

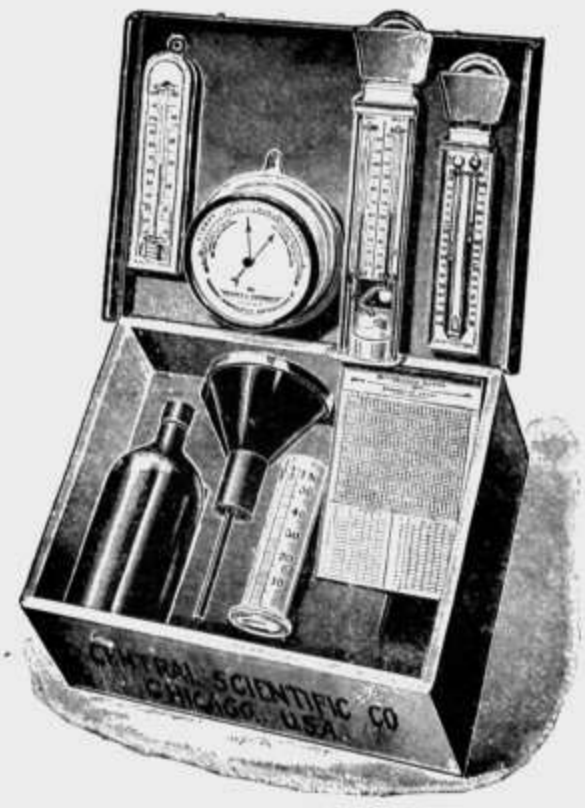
1215. **Aneroid Barometer,** pocket mountain type, watch case form, 1¾ inches in diameter, first quality, compensated for temperature, silvered metal dial, revolving altitude scale, 3,000 feet, in gilt case. Inclosed in neat morocco case .....Net 16.00

1217. **Aneroid Barometer,** same as No. 1215, reading to 10,000 feet.....Net 15.00

1218. **Aneroid Barometer,** same as No. 1215, reading to 16,000 feet.....Net 18.00


No. 1217.


No. 1219.




No. 1220.

1219. **Surveying Aneroid,** 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 single feet of altitude scale. 3 inch bronze metal case, silvered metal dial, with vernier scale moved by rackwork motion, reading lens arranged to traverse the entire circle, altitude scale 6,000 feet, in solid leather sling case.....Duty free $ 40.00

1220. **Universal Meteorological Set,** a complete set of meteorological instruments suitable for a beginner, and of such a quality as to give entire satisfaction. The set comprises a 5 inch metal case aneroid barometer, 8 inch thermometer with F. and C. scales, 8 inch maximum and minimum (Six's) thermometer with magnet, 8 inch Mason's wet and dry bulb hygrometer, 5 inch Howard rain gauge, and a calendar for keeping a record of the instruments in the set. Packed in neatly finished box ..... 16.65

1221. **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. By a comparison of outside air temperature and the direction of the wind at 30 inch readings, with temperature and wind reference given on the chart, one can know the nature of a coming change of weather, also the general location of centers of areas of high and low pressure and the rapidity with which the pressure areas travel, which will be indicated by the rate of change of the barometer. High pressure areas read above, while low pressures read below, 30 inches. This chart will be found quite accurate and most useful in any science laboratory. Full directions on each chart. Each ..... .50

1221A. **"Weather and Weather Instruments."** Many teachers have written us for information regarding the management and use of weather instruments. This book contains the most complete information of any book or books of which we have knowledge. It 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 covers..... .50

1221B. **"Weather and Weather Instruments,"** same as above, cloth covers... 1.10

1222. **Rain Gauge,** United States Weather Bureau type. 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 ..... $ 2.75

1222A. **Rain Gauge.** United States Weather Bureau standard rain gauge. Similar to No. 1222 but 8 inches in diameter, with measuring stick. ..... 6.65


**No. 1222.**

**No. 1222B.**

1222B. **Registering Rain Gauge,** "tilting bucket" type. The rain is collected in an 8-inch receiver, taken through a small pipe and dropped into one side of a bucket. When 1/100 inch of rain has collected in the bucket, the weight of the rain causes it to overbalance, and by a mechanical arrangement the hand moves 1/100 on the dial. The rain is then collected in the opposite bucket, and when that has received the same amount the above operation is repeated. This rain gauge has the great advantage of being zero-setting and is, therefore, particularly useful when a record of rainfall by the month or week is desired, as by the zero setting device no calculation is necessary. The large dial registers 1 inch by 100ths. The small dial reads to 12 inches. In copper case 10x8 inches..... 25.00

No. 1223.

No. 1225.

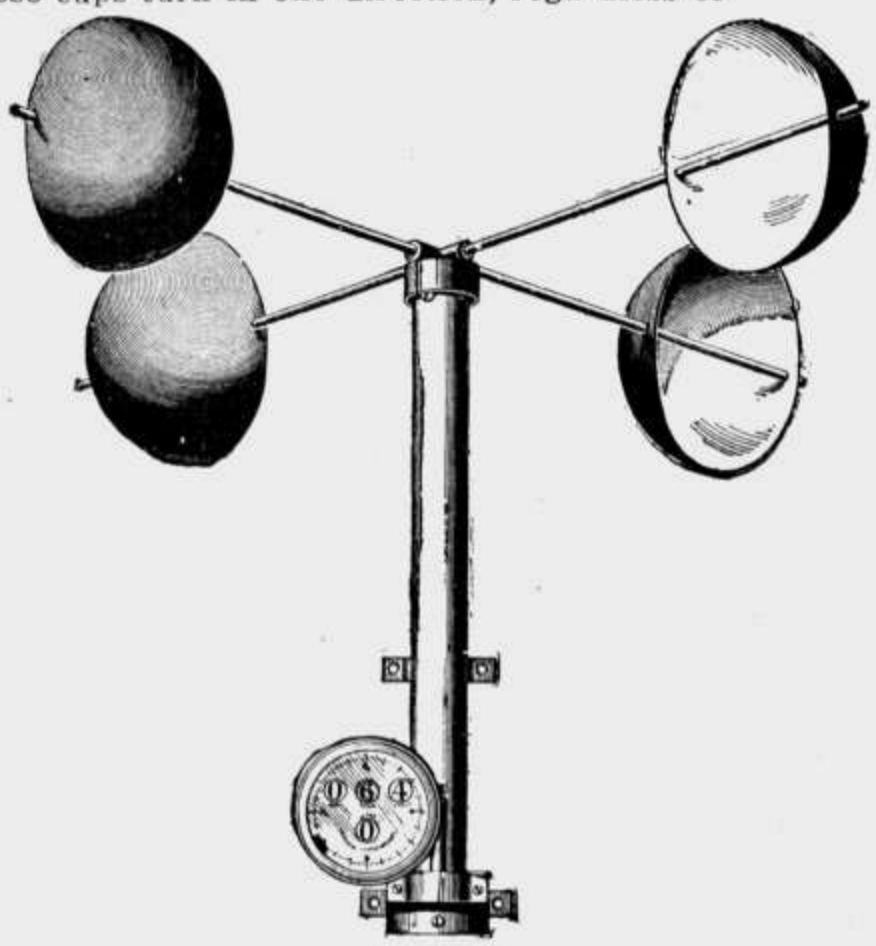
1223. **Anemometer,** portable form, for measuring velocities of air currents in buildings, etc. Indications are obtained by means of a delicately poised fan wheel 2¾ inches in diameter. The long hand indicates on the outer circumference of the main dial the passage of 100 feet or less of air. The readings are continued up to 100,000 feet by a series of smaller dials, as shown in the illustration. Complete with jointed socket holder, zero setting device and disconnector, in leather case ..... Net. $ 22.50

1225. **Anemometer, Biram's,** 4 inches in diameter, four dials reading to 100,000 feet, complete with zero setting device and disconnector, in leather case ..... Net. 21.00

1227. **Wind Gauge or Anemometer.** This simple device for indicating the velocity of the wind in miles consists 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, and at a ratio determined by experiment. To the lower end of the shaft is rigidly fastened a plate carrying two small roller bearings, which, as the shaft revolves, actuate a wheel, which in turn meshes into a series of other wheels; thus the miles are indicated on the registering dial. The dial is so divided as to show velocities from one hundredth of a mile to 10,000 miles, and then it repeats, commencing at zero.

This instrument is carefully made and requires no care or attention, save a little oiling, say once a month. All parts are interchangeable.

Each instrument is standardized and fully warranted; weight, 3½ lbs. ..... Net. $ 26.75



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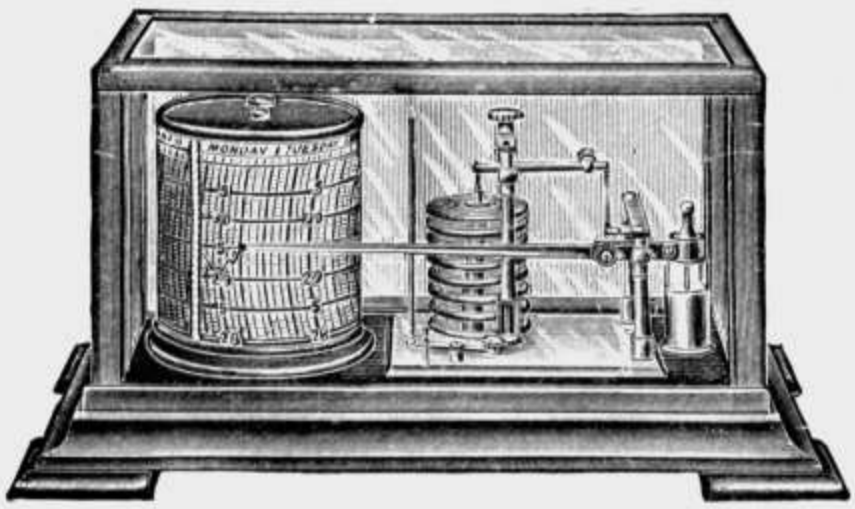
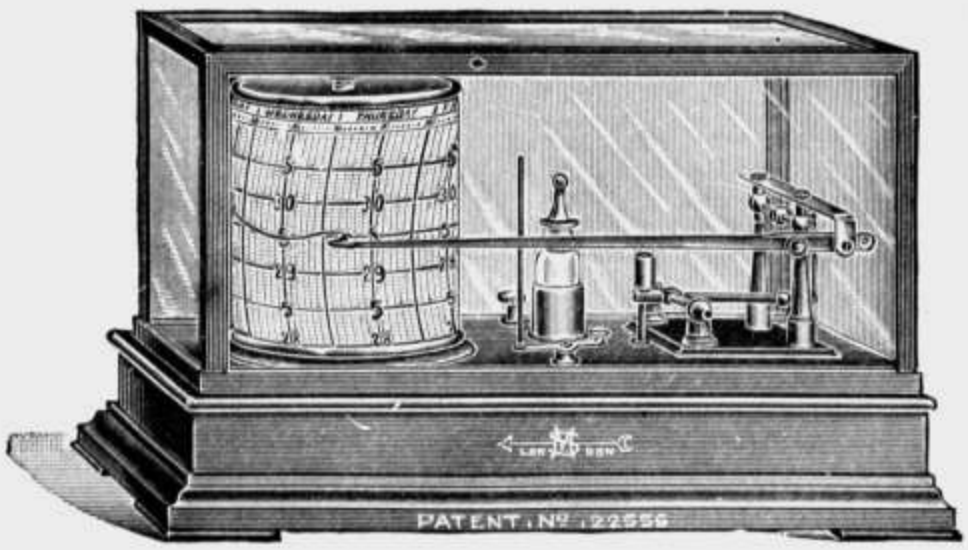


**No. 1229.**

1229. **Barograph (Recording Barometer),** a most interesting instrument to those who take note of atmospheric variations, as a complete record is given by a pen upon a printed chart for an entire week, and, by its form, the exact barometric reading can be seen at any moment, as well as the varying line traced by the pen for the time preceding. The charts, which are changed at the beginning of each week, can be retained as a record for the entire year. The mechanism consists of a series of vacuum chambers, eight in number, joined to each other. The movement of pen is magnified by a series of levers. Chart reading 28 to 31 inches is held on a drum driven by eight day clock movement. Mahogany frame with glass case. Complete with full directions for use, charts for a year, pen and ink....Duty free $ 30.00

1229A. **Barograph,** same as No. 1229, but in copper case, glass front and end, with handle. Cover hinged at end. Complete with directions for use, charts for a year, pen and ink.....Duty free 33.00

1229B. **Barograph,** same as No. 1229, but for use in high altitudes. Unfigured charts are supplied graduated for a range of 3 inches, the numbers to be written in by the user. In ordering specify in what altitude the instrument is to be used.....Duty free 32.50



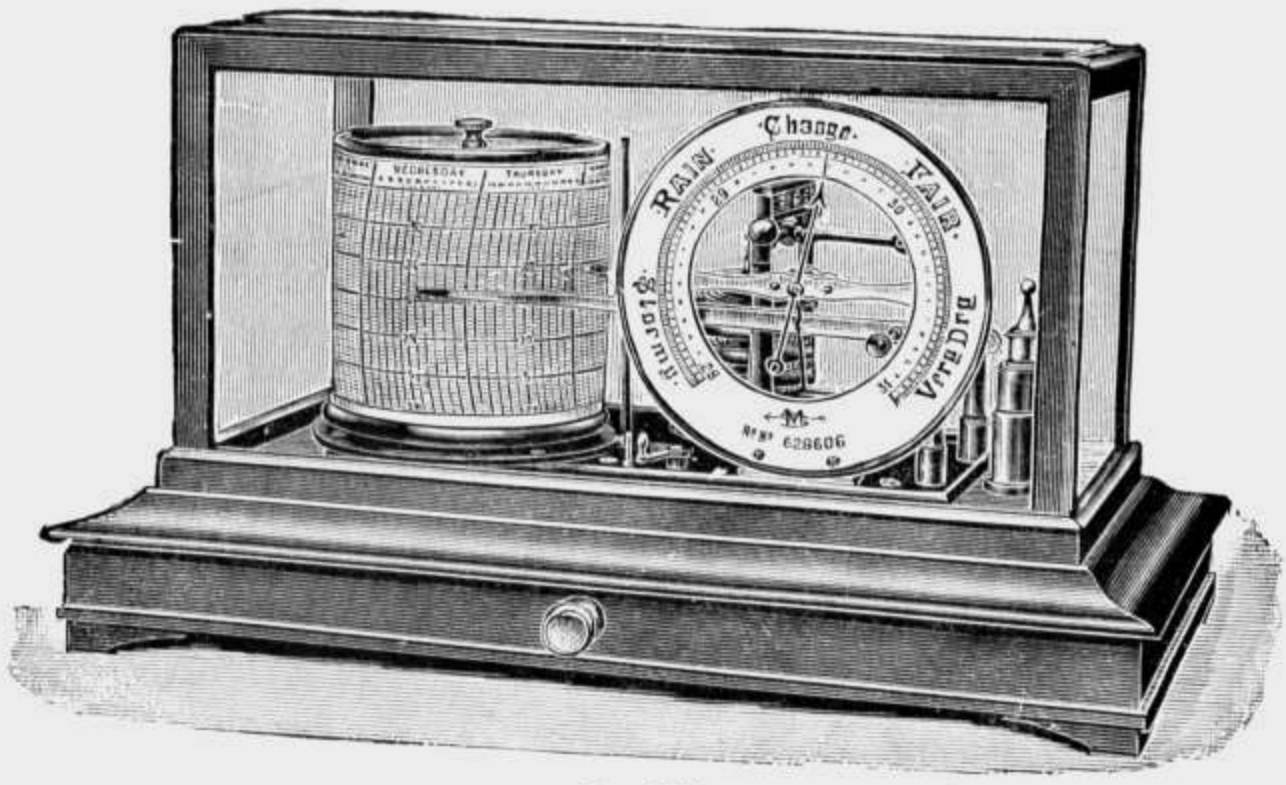

**No. 1230.**

1230. **Barograph,** same as No. 1229, but of new design. The movement is worked by a large vacuum pan concealed in the base of the instrument. In fumed oak case, glass top and sides. Complete with full directions for use, charts for a year, pen and ink.....Duty free 25.00

**Certificate from Kew Observatory,** extra..... 7.50

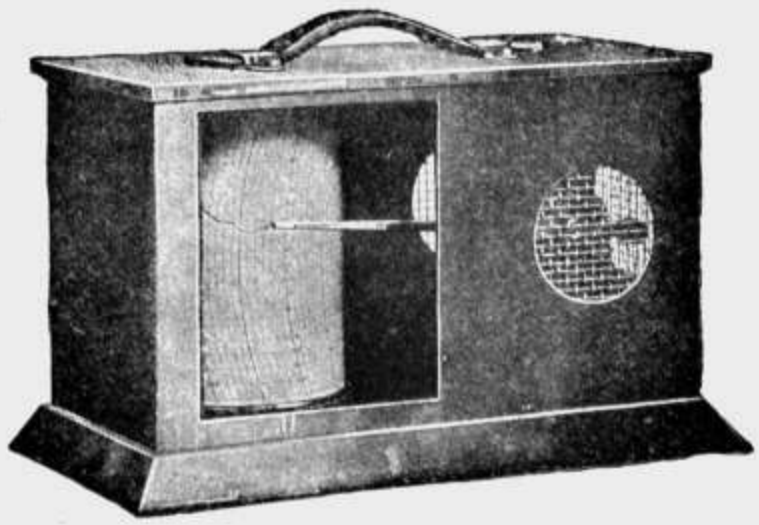
1230A. **Barograph Charts,** for barographs reading 28 to 31 inches. Per box containing one year's supply..... 2.00

1230B. **Barograph Charts,** unfigured, but graduated for a 3 inch range. For use with No. 1229B Barograph, the numbering being done by the user. Per box containing one year's supply..... 2.00




**No. 1231.**

1231. **Barograph.** The illustrated instrument shows No. 1229 Barograph (with drawer) with metal dial aneroid attachment. For range and description of movement see No. 1229.....Duty free $ 40.00



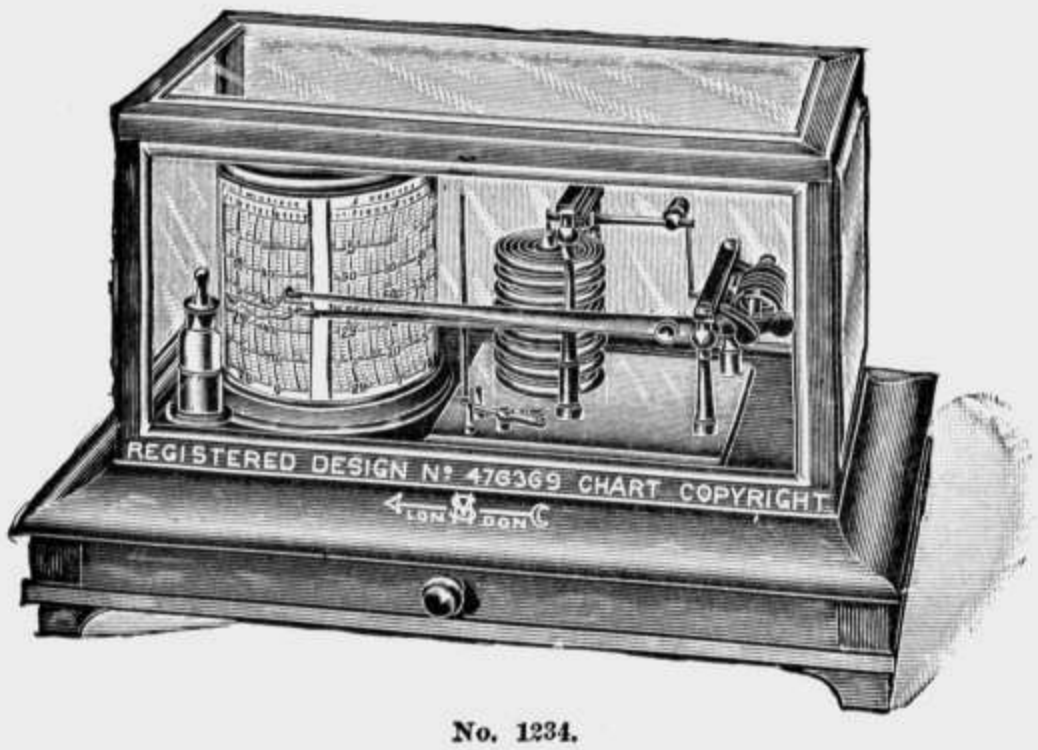
**No. 1232.**

1232. **Thermograph (Recording Thermometer).** 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 an 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 copper case, with glass front and screened openings on three sides about the lamina. With handle. Range —62 to +128 degrees F. Complete with full directions for use, charts for one year, pen and ink.....Duty free 28.00

**Certificate from Kew Observatory,** extra..... 7.50

1232A. **Thermograph Charts,** for use with No. **1232,** per box containing a year's supply. (Style No. 46)..... 2.50

1232B. **Thermograph Charts,** for use with low drum thermographs. (Style No. 37)..... 2.25




**No. 1234.**

1234. **Baro-Thermograph (Recording Barometer and Thermometer Combined),** a recent improvement whereby both barometric and thermometric tracings are made on the same chart, records being made by two pens in different colored inks (blue for the barograph and green for the thermograph). Range of the barograph is from 28 to 31 inches, while the thermograph shows a range of 0 to 120 degrees F. in 2 degree lines. In Mahogany case, with glass sides and top .....Duty free $ 50 00

1234A. **Baro-Thermograph Charts,** for use with No. 1234, per box containing one year's supply..... 2 50

**No. 1235.**


**No. 1236.**

1235. **Shelter.** The latest pattern Weather Bureau Instrument Shelter. Sufficiently large to hold Barograph or Thermograph and the two instruments shown in the cut. Made of best quality white pine wood, painted three coats lead paint, swing door provided with lock and key. Complete with screws for mounting. Shipped "knocked down" .....Net 20 00

1236. **Sunshine Recorder.** This instrument records the duration and intensity of sunshine for twenty-four hours on a specially prepared photographic chart, which merely requires washing in cold water to become permanent. The chart being divided into hours, an exact record is thus obtained with the minimum of trouble. Complete with divided arc for adjustment of instrument to any latitude, with 100 charts and directions for use.....Duty Free 15 00

1236A. **Extra Charts for Above,** per 100..... 3 35

1238. **Ink,** purple, for Barographs and Thermographs. Per ounce bottle.... 50