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with satisfaction guaranteed!*

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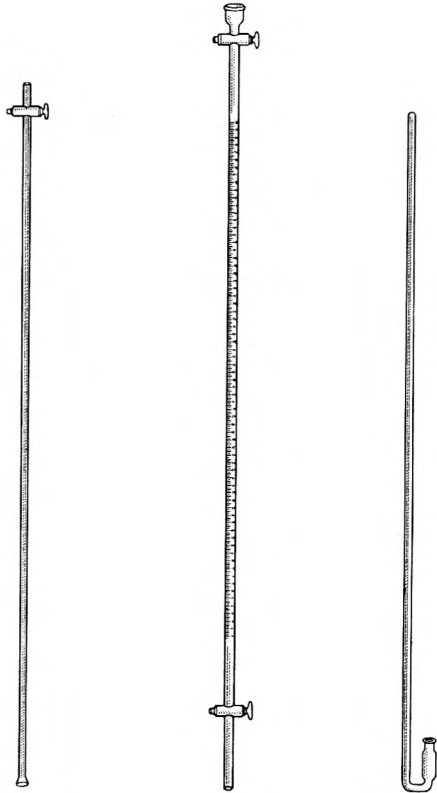
THE WELCH SCIENTIFIC COMPANY OF CANADA, LTD.

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Vancouver, B. C., Canada

DEMONSTRATION MERCURIAL BAROMETERS



No. 1207.

No. 1207A.

No. 1208.

1207. BAROMETER TUBE, with Stopcock. By slanting this tube with its open end in a cup of mercury, the mercury can easily be drawn up past the stopcock, thus providing a rapid method for making an ordinary experimental barometer. It has a 3.5-mm bore. Over-all length, 930 mm. Mercury is not included. **Each, \$6.20**

1207A. BAROMETER TUBE, with Funnel Top and Stopcocks. For easy filling and emptying. The bore is 2.5 mm. It is graduated from 100 to 780 mm in millimeter divisions, numbered every cm. Over-all length is 105 cm. **Each, \$18.98**

1208. BAROMETER TUBE, Siphon Type. Consists of an unfilled barometer tube of 4-mm bore, with the top end closed and with a U bend and open bulb at the lower end. It is 90 cm long. **Each, \$2.25**



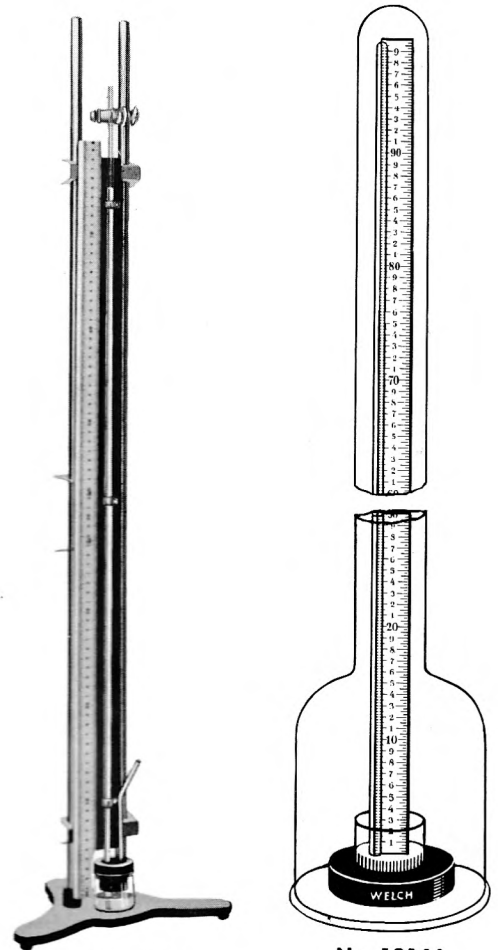
No. 1211.



No. 1211A.

1211. MERCURY WELL. A cast-iron cup 5 cm in diameter, 3 cm high, and with a pouring lip. **Each, \$0.85**

1211A. MERCURY DISPENSER, Pipette and Reservoir. A convenient device for introducing mercury into tubes of small bore. The reservoir is filled through an inlet in the side and by placing the thumb over this opening the flow from the outlet can be nicely controlled. It has a capacity of 30 ml. **Each, \$2.00**



No. 1216.

No. 1216A.

(with No. 1483)

1216. DEMONSTRATION MERCURY BAROMETER. A glass tube 85 cm long with a stopcock and funnel at the top is attached to a meter scale mounted on a metal support. The tube connects to a mercury reservoir at the bottom which also has a connection for attaching a hand pump. Mercury is pumped up the tube past the stopcock. The stopcock is then closed, the pump is disconnected, and the mercury level immediately falls to barometric height. Supplied with hand pump but without mercury. **Each, \$29.50**

1216A. DEMONSTRATION MERCURY BAROMETER, and Vacuum Gauge. This may be used uncovered as a simple barometer. It may also be placed under a tall bell jar on a pump plate to show the effect of reducing atmospheric pressure and the principle of a vacuum gauge. A glass barometer tube of 4-mm bore, attached to a white plastic metric scale, is held in a vertical position by a bracket extending upward from a heavy metal base. The tube is to be filled with mercury and inverted in a mercury reservoir on the base plate. The scale may be adjusted so that its zero coincides with the level of the mercury. Over-all length, 85 cm. Mercury is not included. **Each, \$18.50**

1483. BELL JAR, Tall Form. For use with Demonstration Mercury Barometer. Over-all length, 88 cm. Ground flange on bottom. **Each, \$27.75**

PRACTICAL LOW-PRICED MERCURIAL BAROMETER

The Best Barometer
for the
Elementary Laboratory

1215. MERCURIAL BAROMETER. This instrument is well suited for laboratories needing a good serviceable barometer at low cost yet sufficiently accurate for average use. It is practical to have one mounted in every science classroom and laboratory.

Entire Mercury Column Visible

It consists of a straight tube of 4-mm bore immersed in a mercury cistern and held in a V-shaped rigid metal frame. The front of the V is open to make the entire length of the mercury column visible so that students can see exactly how it works.

The cistern is a clear plastic vessel held between two Bakelite disks, the upper of which prevents contamination of the mercury. The level of the mercury in the cistern is adjusted by forcing a float down into the mercury to give the necessary displacement. Zero level is indicated by the lower tip of a Monel-metal "zero pin" extending down into the cistern near the front where it is clearly visible. The adjustment is made by a knurled nut located on the cistern cover behind the frame. Binding posts are provided so that indication of the zero setting by electrical contact between zero pin and mercury can be used if desired.

Scales Etched on Stainless Steel

The inch scale extends from 25 inches to 31 inches, divided into tenths, with ten part vernier giving readings to 0.01 inch. The metric scale extends from 63.5 cm to 78.8 cm, divided into mm, with a ten part vernier giving readings to 0.1 mm. This range is sufficient for all altitudes from sea level to four thousand feet. The inch and centimeter scales, filled black for good visibility, are etched on a single plate to insure accurate agreement, the plate being carefully adjusted at the factory for proper distance from the zero pin.

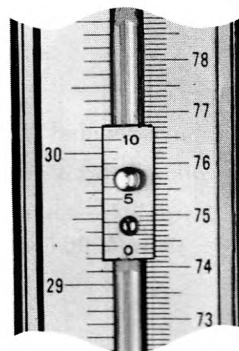
Meniscus Clearly Visible

A milk glass panel mounted in a metal frame behind the upper level of the mercury provides diffused illumination and a light background against which to view the meniscus. The lower edge of the plate on which the verniers are etched serves as the index, or zero, of the vernier. A metal strip attached to the vernier plate and extending around to the rear of the tube has its lower edge always at the same level as the index. By aligning these two edges with the meniscus, parallax error can be eliminated from the setting.

The barometer tube is shipped filled with mercury and ready to be inserted within the frame by the user. Simple assembly instructions are included. The frame is finished in gray Hammerloid and the over-all length is 38 inches. A centigrade-Fahrenheit thermometer is attached to the front. **Each, \$62.50**

FOR HIGHER ALTITUDES

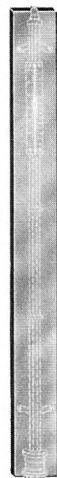
1215B. MERCURIAL BAROMETER, for High Altitudes. Same as above, but with the metric scale graduated from 52 to 73 cm, and with the inch scale graduated from 20.5 to 28.8 inches, making the barometer suitable for use at altitudes from 3,000 to 10,000 feet above sea level. **Each, \$68.75**



Reads to 0.01 inch and 0.1 mm

CONVERSION SCALES FOR BAROMETER READINGS		
MILLIBARS	MM.	IN.
1040	780	
1030	770	
1020		
1010		

Conversion table included with mount and case



No. 1212F.



No. 1214.

1212F. BAROMETER MOUNT. Of formed metal, 3½x36½ inches, with holes for suspending on the wall and for attaching the brackets supplied with barometers listed on this page. It has a gray Hammerloid finish. An etched plate giving conversions between millibars, millimeters and inches is included. **Each, \$8.50**

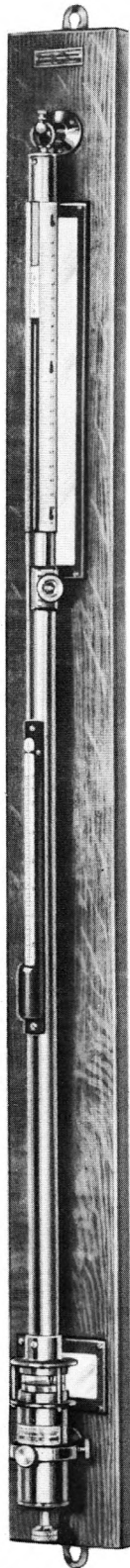
1214. BAROMETER CASE, with Glass Front. For barometers listed on this page, with conversion plate, lock and key. **Each, \$34.50**

Opalescent glass plate illuminates mercury level



No. 1215.

PRECISION MERCURIAL BAROMETER



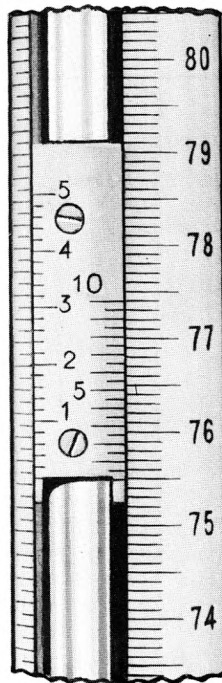
No. 1218.

With No. 1220
Mounting Board

Reads to 0.002 inch and 0.05 mm
Rack-and-Pinion Vernier Adjustment

Engine-Divided Scales
Parallax Errors Minimized

Suitable for Altitudes
Up to 6000 Feet



View of
Metric Scale and Vernier

1220. BAROMETER MOUNTING BOARD. This board is very desirable as a permanent mounting for barometer listed on this page.

It consists of a nicely finished walnut board $3\frac{1}{2} \times 43$ inches to which the following are attached: a brass bracket to receive the ring at the top of the barometer, a steadying ring with screws to clamp about the cistern, and milk glass reflectors at the upper and lower mercury levels to give proper illumination and background for viewing the surfaces when making settings.

Each, \$36.50

The Ideal
Laboratory Standard

1218. MERCURIAL BAROMETER, U.S. Weather Bureau Type. This precision barometer is recommended as a laboratory standard and for routine observations of high accuracy. Its wide range and portability make it suitable for field work.

DESCRIPTION

The instrument is a Fortin type barometer using a heavy-walled glass tube of 6 mm inside diameter, vacuum-filled with mercury, and placed open end down in a cistern of mercury. The tube and cistern are supported and protected by a metal casing in which two vertical slots have been cut at the front and rear near the upper end for viewing the upper level of the mercury column. The portion enclosing the cistern has somewhat larger diameter than the upper part and contains a cylindrical glass window through which the lower level of the mercury can be viewed. Each mercury level is sufficiently exposed to receive proper illumination. A metal ring by which the barometer may be suspended is attached to the top of the casing.

Rack and Pinion Vernier Adjustment

The metric and inch scales are engine divided on nickel silver plates attached one on each side of the front slot. The vernier plate, the lower edge of which is the index, or zero, of both verniers, moves smoothly in the slot between the two scales and butts closely to them, eliminating parallax error from the readings. A portion of the vernier plate extending to the rear of the tube has its lower edge always at the same level as the index, providing means for eliminating parallax error in sighting on the meniscus. The vernier plate is adjusted by rack and pinion, the pinion knob being conveniently placed slightly below the scales.

The metric scale is divided in millimeters from 61 cm to 81.3 cm, with every centimeter numbered. The 20-part metric vernier permits readings to 0.05 mm. The inch scale is divided to 0.05 inch from the 24 inches to 32.7 inches and its 25-part vernier provides readings to 0.002 inch. The highest readings obtainable with the verniers are 80.5 cm and 31.65 inches, respectively. The barometer is therefore suitable for elevations from about 1500 feet below to about 6,000 feet above sea level.

Portable

The mercury level is adjusted by means of a knurled screw mounted at the bottom of the casing and pushing against the flexible bottom of the cistern. The zero level is indicated by the lower tip of an ivory point permanently fixed to the ceiling of the cistern and accurately adjusted at the factory to coincide with zero of the scales. When the knurled screw is turned all the way into the casing, mercury fills the entire cistern and tube except for a very small volume to allow for thermal expansion. In this condition the barometer can be placed in any position within 60° of vertical and is therefore portable.

The metal parts of the barometer have a durable, attractive, black nickel finish. A mercury thermometer with a range of -12°C to $+50^\circ\text{C}$ and $+10^\circ\text{F}$ to $+120^\circ\text{F}$ is mounted on the front of the casing.

No. 1220 Mounting Board is recommended for use with this barometer but is not included. Each, \$185.00

PRECISION MARINE BAROMETER

Reads to 0.002 Inch and 0.1 Millibar

No Zero Adjustment

Glass-Enclosed Scales

Meets U.S. Navy Specifications

1225. MERCURIAL BAROMETER, Precision Marine Type. This instrument will meet the requirements of those needing the finest mercury barometer available. It was designed by Welch according to U.S. Navy specifications and is supplied to the Navy and to various other users, both for ship-board and for laboratory installations. It reads by vernier to 0.002 inch and to 0.1 millibar.

Uses Fixed Cistern

The need for zero adjustment has been eliminated in this design. The instrument uses a mercury cistern three inches in diameter, which gives a ratio of vertical movement of the mercury in the tube for a change of elevation of the mercury in the tube of almost 1 to 100. By compensating the scale graduations to correct for the slight error, a permanent zero of the scales is obtained. In other words, a reading of the barometer scale gives the true reading of the barometer at all times without further adjustment. The possibility of zero-setting error thus no longer exists.

Convenient to Read

The scales are of nickel silver and when mounted on the barometer shell are completely enclosed by a sleeve of glass tubing. Even after years of service the scales will be bright and the mercury tube clean.

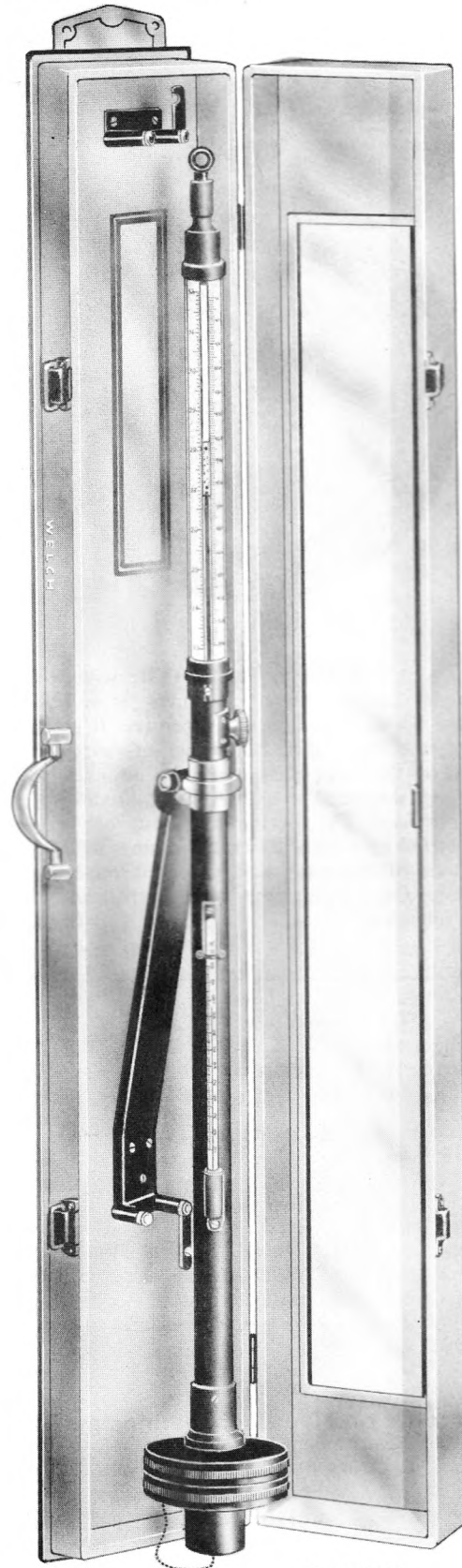
The inch scale is graduated to 0.05 inch and is read by a 25-part vernier to 0.002 inch. The millibar scale is graduated to 2 millibars and is read by a 20-part vernier to 0.1 millibar. The verniers are moved by a rack and pinion operated by a thumb nut on the outside of the barometer shell. An attached thermometer reads from 10°F to 120°F.

Built for Seagoing Service

To prevent tube breakage by disruptive surges of mercury toward the top of the tube when the ship rolls, the central portion of the tube contains a capillary section 16.5 inches long. This provides a drag on sudden movements of the mercury without affecting the accuracy. This same feature is of advantage whenever transporting the barometer.

For use in stationary locations the barometer may be supported by the metal ring at the top of the shell. The instrument is shipped with the tube vacuum-filled and in place ready for operation. Without case. **Each, \$225.00**

1225A. MARINE BAROMETER, in Case. For all seagoing installations, and for protection and convenience in stationary installations, this instrument and case are recommended. The barometer is the same as above. The case is of copper with a full-length glass door, and provided with a hinged-arm support with a gimbal joint which holds the barometer vertical and completely clear of the case to compensate for the roll of the ship when taking observations. When not in use, the barometer retracts into the case. The over-all dimensions are 6x6½x41 inches. **Each, \$265.00**



No. 1225A.

ANEROID BAROMETERS

Standard Model

For Limited
Budgets

No. 1236.

1236. ANEROID BAROMETER, with 9-cm Dial. This model has all essential features, is sufficiently accurate for normal use, and is inexpensive. It reads to 0.05 inch and to 1 mm and an adjustable reference indicator is mounted on the front glass cover. An adjustment for giving readings corrected to sea level at altitudes up to 3500 feet is provided. The mechanism is ruggedly constructed and protected by a polished brass housing. Its construction and method of operation may be seen through an opening in the dial. Over-all diameter is 13.5 cm. An instruction sheet is included. **Each, \$16.50**

Precision Model

Temperature
Compensated

No. 1232.

1232. ANEROID BAROMETER, Precision Type (Taylor). This barometer, which meets Navy and Weather Bureau requirements, is temperature compensated to insure very accurate readings.

The 12-cm dial is graduated to 0.02 inch and to 1 mm. The mechanism, which may be seen through an opening at the center of the face, is highly corrosion-resistant and will give long service even under adverse conditions. It may be adjusted to give readings corrected to sea level at altitudes up to 3500 feet. An extra arrow, serving as a reference indicator and adjustable by a knob at the center of the glass face, will show over an interval of time the extent of rise or fall of pressure. The case is of highly polished lacquered brass. **Each, \$59.50**

For a complete listing of

Aneroid Barometers

Recording Barometers

Hygrometers

Wind and Rain Gauges

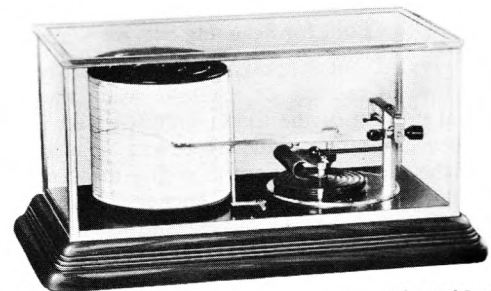
Indoor and Outdoor Thermometers

Thermographs

see

WEATHER INSTRUMENTS

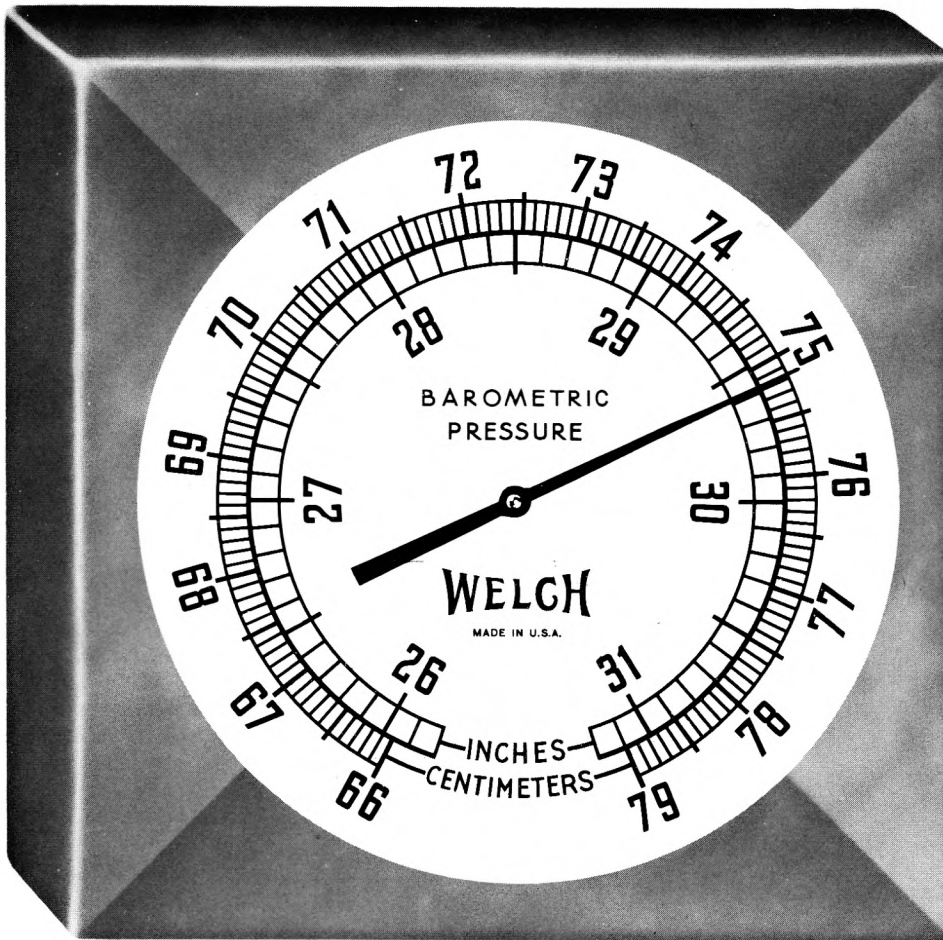
in alphabetical index



No. 1316.

LARGE ANEROID WALL BAROMETER

12-INCH DIAL

Glass-Covered
DialAttractive
Walnut CaseLegible
Black Numerals
and Scales on
White Background

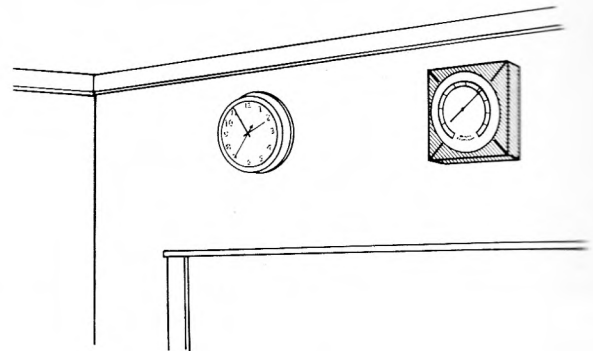
No. 1233.

When this Barometer is on the classroom wall, students teach themselves to read barometric pressure as naturally as they read time with a clock

Daily weather reports have greater meaning to the student

1233. BAROMETER, Large Wall Model. The teaching value of this large aneroid barometer is most gratifying. When it is mounted on a classroom wall the students learn to glance at it from time to time each day, reading its large 12-inch dial as easily and naturally as a clock. It continuously reminds them of the relationship between the day's weather and atmospheric pressure changes and familiarizes them with the extent of change normally to be expected.

The mechanism has an operating torque many times as great as that of the ordinary aneroid barometer, making



unnecessary the tapping customary with small instruments to overcome slight frictional resistance. Its sensitivity is nevertheless higher, the backlash lower, and the temperature error negligible. The inch scale is graduated to 0.1 inch of Hg and may be read by estimation to 0.01 inch with ease. The metric scale is graduated to 1 mm and can be read by estimation to 0.2 mm. It is set for true atmospheric pressure but can be adapted to sea-level readings by means of a screw in the bottom of the case. The over-all dimensions of the walnut case are 14x14x3 inches. Each, \$124.50

TWO POPULAR BAROMETERS FOR SCHOOLS

Both Have All Essential Features

For Limited Budgets

9-cm Dial



No. 1236.

1236. ANEROID BAROMETER, with 9-cm Dial. This model is sufficiently accurate for normal use and is inexpensive. It reads to 0.05 inch and to 1 mm and an adjustable reference indicator is mounted on the front glass cover. An adjustment for giving readings corrected to sea level at altitudes up to 3500 feet is provided. The mechanism is ruggedly constructed and protected by a polished brass housing. Its construction may be seen through an opening in the dial. The case is 13.5 cm in diameter. An instruction sheet is included. **Each, \$16.50**

12-cm Dial



No. 1239.

1239. ANEROID BAROMETER, with 12-cm Dial. Because of the large, clear divisions on the scale and the over-all rugged construction, this barometer is well suited either for the laboratory or for contour work in the field. The mechanism has practically no backlash.

The 5-inch-diameter case is made of heavy, spun brass, polished and lacquered. The scale is graduated to 0.05 inch and to 1 mm of mercury over a range of 26 to 31 inches and 66 to 79 cm, respectively. A reference pointer, adjustable by a knob on the front, indicates the extent of pressure changes, essential in forecasting weather. An adjustment is provided to give readings corrected to sea level for elevations up to 3500 feet. An instruction booklet, a weather chart, an elevation adjustment guide, and a cm-inch-millibar conversion chart are included.

Each, \$23.50

PRECISION ANEROID BAROMETERS



No. 1232.

1232. ANEROID BAROMETER, Precision Type (Taylor). This barometer, which meets Navy and Weather Bureau requirements, is temperature compensated to insure very accurate readings.

The 12-cm dial is graduated to 0.02 inch and to 1 mm. **Each, \$59.50**

Both Instruments Have High Reliability

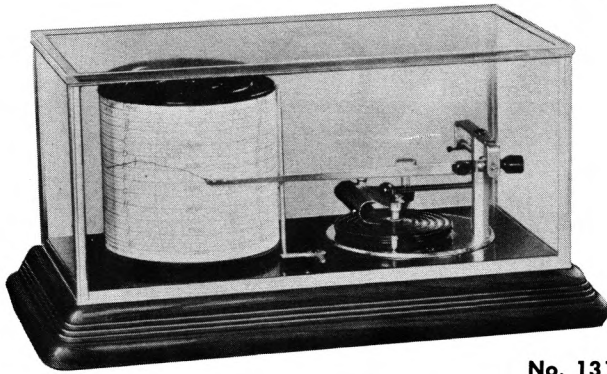


High-Altitude Type

No. 1246.

1246. ANEROID BAROMETER, High-Altitude Type (Taylor). Intended for altitudes from 2900 to 7100 feet above sea level, this barometer reads from 23 to 29 inches in 0.02-inch divisions. It has a brass case with an adjusting screw on the back. The face is 13 centimeters in diameter, has an adjustable reference indicator, and has sharp clear divisions and numerals. **Each, \$59.50**

RECORDING BAROMETERS



No. 1316.

1316. RECORDING BAROMETER, or Barograph (Taylor). The Barograph is a high-grade aneroid barometer with a long indicating arm and ink stylus which continuously records the barometric pressure on a chart mounted on a revolving drum. An eight-day, spring-wound, clock mechanism within the drum drives the drum one revolution per week and the record is to be changed once a week. The chart is divided horizontally into 2-hour intervals and vertically into 0.1-inch pressure increments from 28.00 to 31.00 inches. It is adjustable for any altitude from 0 to 3,500 feet.

An instrument of this type is essential in forecasting weather accurately. A small weather-forecast chart with

A
PRECISION BAROGRAPH
for
SCIENTIFIC FORECASTING

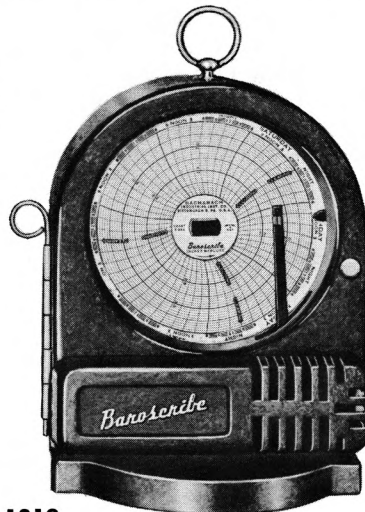
Includes
Weather-Forecast Chart

interchangeable printed forecasts, and with instructions for using the barograph and chart, are included. This feature will be particularly interesting and instructive for classroom use.

All parts are enclosed in an attractive dustproof, plastic-covered case 32x18.5x16 cm high. A year's supply of charts and a bottle of ink are included. **Each, \$175.00**

PORTABLE
BAROGRAPH

Convenient
for
Field Trips



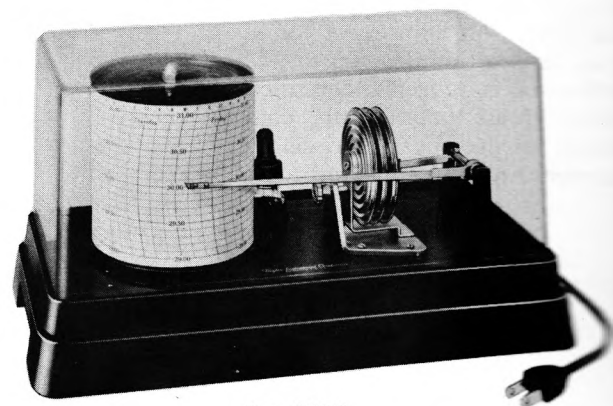
No. 1319.

1319. RECORDING BAROMETER, "Baroscribe." The Baroscribe provides continuous recording of barometric pressure on a dial chart covering a period of one week. It shows the extent of rise and fall, the rate of change, and the time the changes occur—information essential to accurate weather forecasting. Its construction is such that it will stand on a desk, can be hung on a wall, or can be conveniently carried. Its range is from 28 to 31 inches of mercury.

The unit consists of an 8-day, spring-wound clock movement, with revolving dial and reset knob, mounted in a brown plastic housing 5¼x4½x7½ inches high. The chart is 4 inches in diameter and is visible through a plastic window in the door. A bottle of ink and a box of 100 charts (two-year supply) are included. **Each, \$150.00**

1319A. REPLACEMENT CHARTS. For above Recording Barometer. Package of 100 charts (two-year supply). **Each, \$3.00**

ELECTRIC BAROGRAPH



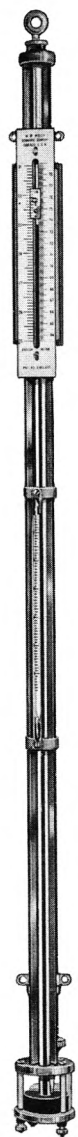
No. 1317.

1317. RECORDING BAROMETER, or Barograph (Taylor). This electrically operated recorder will give excellent service wherever requirements do not justify the precision of more expensive models. It uses a simplified 7-day chart, is intended for use at 0 to 5500 feet elevation, and has a removable one-piece plastic cover. Overall dimensions are 12x6x6 inches. A three-months' supply of charts and a bottle of ink are included. For 115 v. 60 c. A.C. **Each, \$60.00**

1317A. REPLACEMENT CHARTS. For above Recording Barometer. Package of 52 charts (one-year supply). **Each, \$5.00**

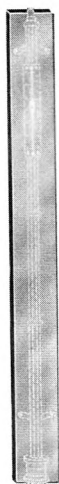
1326. INK, for Recording Devices. One-ounce bottle of blue ink. **Each, \$1.00**

MERCURIAL BAROMETERS

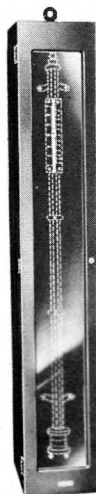


No. 1215.

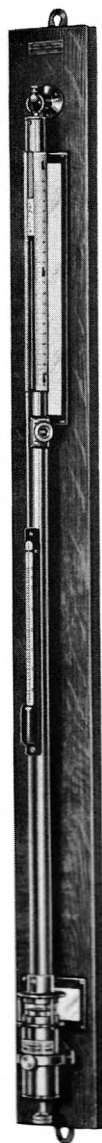
PAT. NO. 1 950 497



No. 1212F.



No. 1214.



No. 1218.

With No. 1220
Mounting Board

1215. MERCURIAL BAROMETER. This is a low-cost serviceable instrument sufficiently accurate for average use.

It consists of a straight glass tube of 4-mm bore immersed in a mercury cistern and held in a V-shaped rigid metal frame. The front of the V is open to make the entire length of the mercury column visible so that students can see exactly how it works.

The range is from 25 to 30 inches, readable to 0.01 inch, or 63.5 to 78.8 cm, readable to 0.1 mm. This range is sufficient for altitudes from sea level to 4000 feet. A Celsius-Fahrenheit thermometer is attached to the front. Instructions for assembling are included. The over-all length is 38 inches. **Each, \$62.50**

1215B. MERCURIAL BAROMETER, for High Altitudes. Same as above, but graduated for use at altitudes from 3000 to 10,000 feet above sea level. **Each, \$68.75**

1212F. BAROMETER MOUNT. Metal, for mounting either of the above barometers. **Each, \$8.50**

1214. BAROMETER CASE, with Glass Front. For either of the above barometers. With lock and key. **Each, \$34.50**

1218. MERCURIAL BAROMETER, U. S. Weather Bureau Type. For routine observations of high accuracy or as a laboratory standard, this barometer is highly recommended.

The instrument uses a 6-mm bore heavy-glass tube placed in a mercury cistern, completely protected by a metal casing in which slots have been cut for viewing the upper end of the mercury column and the mercury level in the cistern. The scale range is 61 to 81.3 cm, readable to 0.05 mm and 24 to 32.7 inches, readable to 0.002 inch. The barometer is suitable for use from 1500 feet below to 6000 feet above sea level. A thermometer is mounted on the front. The barometer can be placed in any position within 60° of vertical, and is therefore portable. **Each, \$185.00**

1220. BAROMETER MOUNTING BOARD. For permanent mounting of the above barometer. **Each, \$36.50**

For a More Complete Description of
MERCURIAL BAROMETERS
See Page 127

Beaufort

Francis Beaufort (1774-1857) devised the scale of wind force and weather notation which are in common use today. His symbols are still used on weather maps and are convenient as they are for the most part self-explanatory.

Beaufort was the son of an Irish rector and entered the British Navy at the age of thirteen. He eventually rose to the rank of Rear-Admiral after actively serving in many different capacities. In one skirmish with the French he was wounded by three sword slashes and sixteen musket balls. He later carried out extensive work in surveying, and at the age of 31 proposed the scale of winds now in use. In 1829, he became hydrographer to the Navy.

Beaufort's scale assigns a whole number for succeeding intervals of wind velocities from 0 for less than 1 mile per hour (calm) to 12 for more than 65 mph (hurricane). This system replaced the less critical Logbook Terms in general use for many years and still in favor with many sailors. He also produced a series of letter notations for weather designation, as r for moderate rain, R for heavy rain, rr for continuous moderate rain, iR for intermittent heavy rain, etc. Other letters are used for snow, hail, cloudy, and other conditions.

Beaufort was elected a Fellow of the Royal Society and was knighted. He lived to see his system come into general use within his lifetime.

DEMONSTRATION BAROMETERS

MERCURIAL TYPE

Models for Use with
Hand or Mechanical Vacuum Pump

Show That Mercury Level
Depends upon Air Pressure

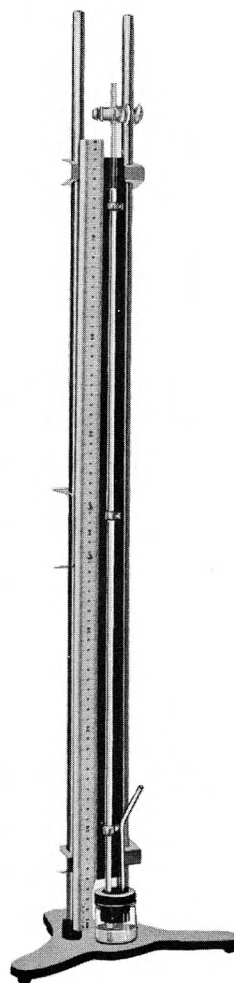
1216. DEMONSTRATION MERCURY BAROMETER. A glass tube 85 cm long with a stopcock and funnel at the top is attached to a meter scale mounted on a metal support. The tube connects to a mercury reservoir at the bottom which also has a connection for attaching a hand pump. Mercury is pumped up the tube past the stopcock. The stopcock is then closed, the pump is disconnected, and the mercury level immediately falls to barometric height. Supplied with hand pump but without mercury.

Each, \$29.50

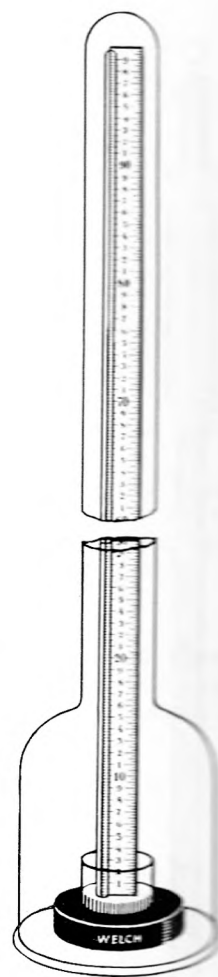
1216A. DEMONSTRATION MERCURY BAROMETER, and Vacuum Gauge. For use under a tall form of bell jar on a pump plate. A glass barometer tube of 4-mm bore is attached to a metric scale 83 cm long which may be clamped to a circular metal base plate 9 cm in diameter, which holds it in a vertical position. The tube is to be filled with mercury and then inverted in a mercury well supported on the plate. The scale may be adjusted so that its zero coincides with the level of mercury in the well, thereby giving direct readings. The bell jar and mercury are not included.

Each, \$18.50

1483. BELL JAR, Tall Form. For use with the above demonstration barometer. Each, \$27.75
MERCURY METAL, Technical. 1-lb bott Each, \$12.00



No. 1216.



No. 1216A.

DEMONSTRATION ANEROID BAROMETER

1230. ANEROID BAROMETER, Demonstration Type. This demonstration barometer uses a well-made aneroid movement mounted inside a glass dome with all parts in clear view so that its operation can be studied. In addition to indicating true atmospheric pressure, the pressure within the dome can be arbitrarily increased by means of a rubber bulb to show how the mechanism reacts to pressure changes.

The mechanism is mounted on a metal support so constructed that it will stand with the dial either vertical or horizontal, permitting observation by large or small groups. The glass dome, held tightly to the support by two knurled nuts, can be removed for close study or adjustment of the mechanism. An outlet valve and the rubber bulb with its pressure valve are attached to the rear of the support. The bulb can be removed and suction applied to the outlet to demonstrate reduced pressure. The dial is 15 cm in diameter and is calibrated in both inches and centimeters of mercury so that it can be used as the common aneroid barometer in addition to being an ideal demonstration instrument. The bulb and connecting rubber tubing are included.

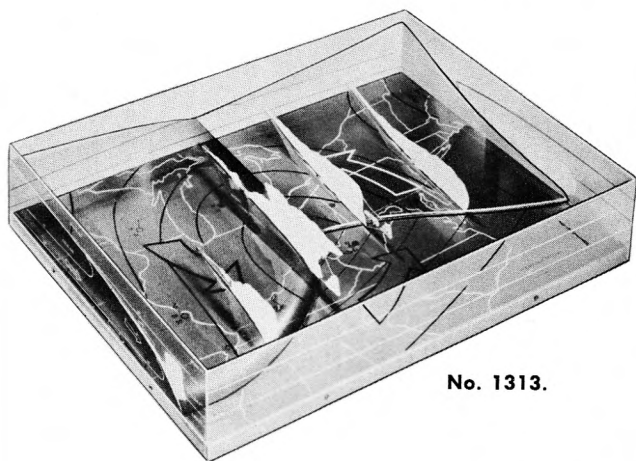
Each, \$48.50



No. 1230.

MODEL FRONTAL SYSTEM

For Teaching Basic Weather Principles



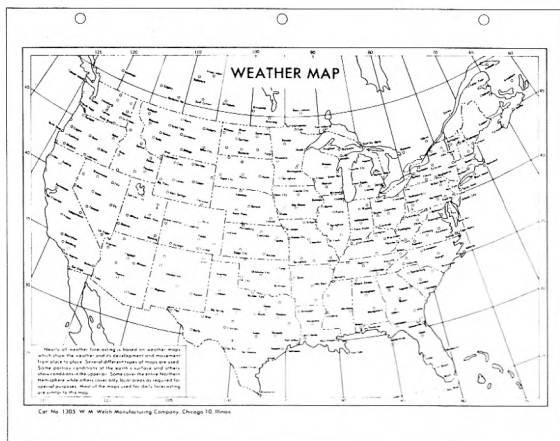
No. 1313.

1313. WEATHER MODEL. A typical warm front and cold front are represented by a three-dimensional frontal surface on this scale model. It depicts the early stage of cyclonic storm developments superposed on a weather map of a portion of the United States. Station models, different types of clouds, isobars, and areas of precipitation are shown. The model is useful in earth science, physical science, general science, and physics classes in teaching basic weather, weather forecasting, and the understanding of weather maps.

The model is formed of clear plastic imprinted in transparent colors to denote warm- and cold-air masses. The entire storm front is removable for class study of the weather map. The model is 16x12x3 inches high. An informative, illustrated study guide is included.

Each, \$27.50

WEATHER MAPS



No. 1305.

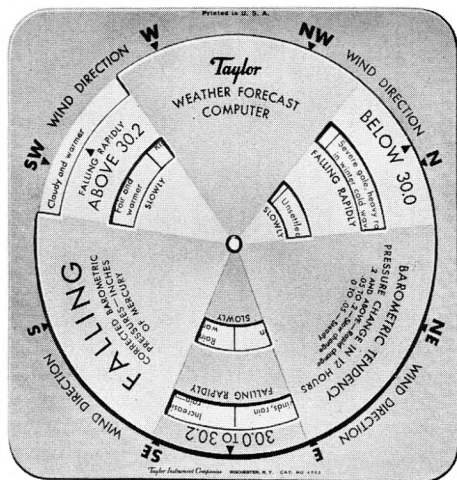
1305. WEATHER MAP. Map of the United States, showing cities and states, for recording weather data. Size, 7¾x9¾ inches. Package contains 100 maps. **Pkg, \$1.75**



No. 1306A.

1306A. WEATHER MAP, Demonstration. Bright colors are used on this weather map of the United States. The surface may be marked with wax pencil and wiped clean. The map is 17x24 inches on heavy board. Useful technical information is on the back.

Each, \$1.50 Pkg of 9, \$9.00



No. 1253.

WEATHER FORECAST COMPUTER

Use with Other Weather Instruments for Weather Prediction

1253. WEATHER FORECAST COMPUTER. This simple device, which anyone can use, predicts weather 12 to 24 hours in advance with remarkable accuracy. To use it one must know the barometric pressure, whether the pressure is rising or falling, and the direction of the wind. The prediction is indicated by setting a dial. The card is 4x4 inches with full instructions thereon. **Each, \$0.35**

To give you the best possible service nearly every item in this catalog is carried in stock.

WEATHER STATION

Measure

Wind Velocity

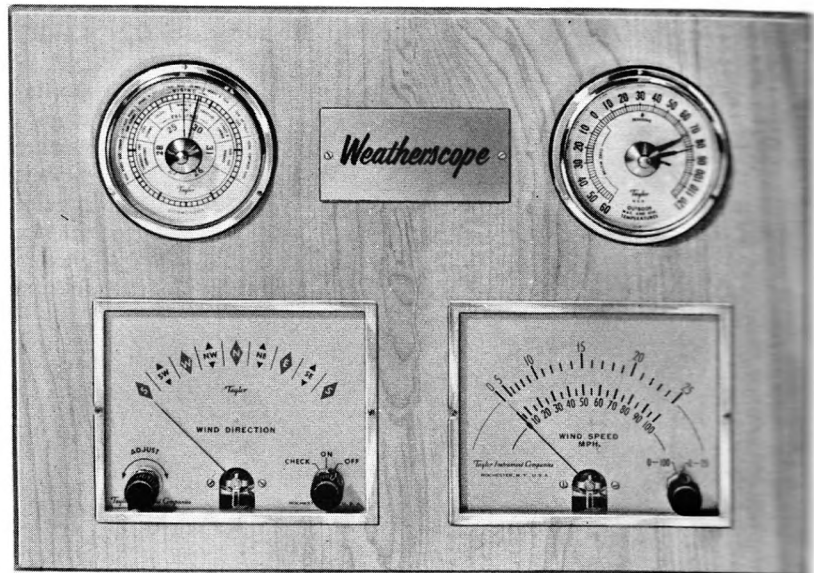
Wind Direction

Maximum and Minimum
Outdoor Temperatures

Barometric Pressure

ALL FROM INSIDE THE CLASSROOM

Quality Instruments Mounted on One Panel

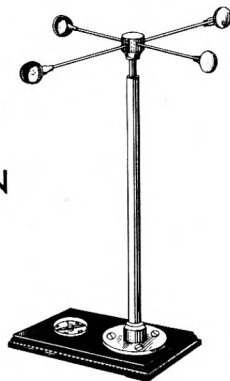


No. 1269.

1269. WEATHERSCOPE WEATHER STATION (Taylor). All the most essential data for weather forecasting is provided on the classroom wall or desk by this complete weather station. It indicates wind speed and direction, present outdoor temperature plus maximum and minimum values since the last resetting, and barometric pressure with its direction of change. All components are of high quality.

The dials are mounted on a 17x12-inch panel provided with brackets for desk use, or it may be flush mounted on the wall. The outdoor temperature-sensing bulb is equipped with 20 feet of capillary tubing and the cup-and-vane assembly is equipped with 60 feet of weatherproof cable, additional lengths of each being available on order. Instructions are provided.

Each, \$249.50

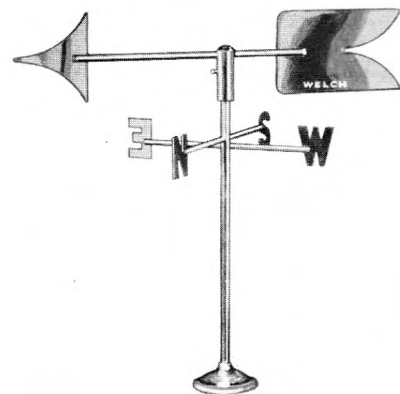
ANEMOMETER
DEMONSTRATION

No. 1312.

1312. ANEMOMETER MODEL. The principle of commercial anemometers is well illustrated by this small classroom model. It has four hemispherical cups mounted at the ends of 10-cm arms attached to a hub which rotates on the point of an upright rod. It turns easily in the draft from any electric fan, increasing speed as the speed of the fan increases. A compass is mounted in the 4x6-inch base. The over-all height is 12 inches.

Each, \$10.85

Use
WELCH GENERAL SCIENCE CHARTS
in Your Teaching
See Page 846

WEATHER VANE
For Permanent Installation

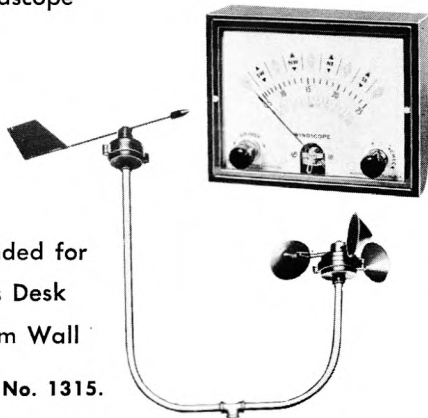
No. 1312A.

1312A. WEATHER VANE. Intended for permanent outdoor installation, this all-metal weather vane is made of non-rusting material painted flat black throughout and will give long service. The 18-inch arrow turns with ease on a ball bearing well enclosed at the top of the support shaft. A set screw prevents the arrow from becoming detached. Directional letters 1½ inches high are mounted on the support rod. A base plate and screws are included.

Each, \$20.00

WIND GAUGE

Windscope



Meter Intended for
Instructor's Desk
or Classroom Wall

No. 1315.

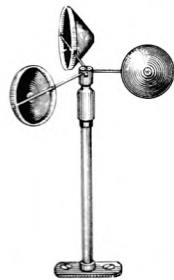
Combined Anemometer
and Direction Indicator

1315. WINDSCOPE (Taylor). Wind speed and direction are both indicated on the one dial of this desk-or-wall instrument. The corrosion-resistant vane and revolving cups are to be mounted on the roof, flag pole, or any other location up to 2000 feet from the indicator. Sixty feet of cable are supplied. Speed indication is self-powered. The direction indicator is powered by a single size D flashlight dry cell. The indicator cabinet is 8x5 inches. Instructions for installation and operation, and the dry cell, are included. **Each, \$119.50**

ANEMOMETERS



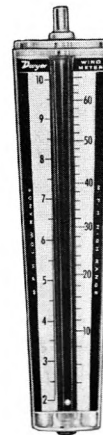
No. 1310.



Indicates Continuously
on Indoor Dial

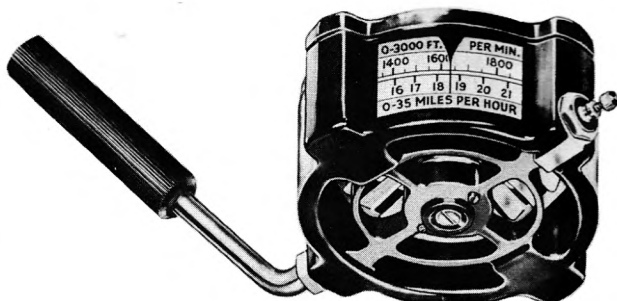
1310. ANEMOMETER, Electric-Indicating. Wind speed in miles per hour is shown continuously on the indoor dial of this anemometer. It operates by electric power from a small generator in the rotating-vane assembly which is to be mounted on the roof or any place exposed to the wind. Fifty feet of connecting wire is included.

The vane assembly is 21 inches high and the diameter of the three-cup wheel is 11 inches. The indicating meter is 4 inches in diameter and reads to 100 miles per hour. Installation is simple. **Each, \$69.95**



No. 1307.

1307. ANEMOMETER, Portable. A reliable but simply constructed hand-held plastic wind velocity indicator reading to 10 mph on one scale and to 60 mph on the other. Indicating accuracy is $\pm \frac{1}{2}$ mph on the low scale, ± 3 mph on the high. About 7 inches long. **Each, \$5.95**



No. 1309.

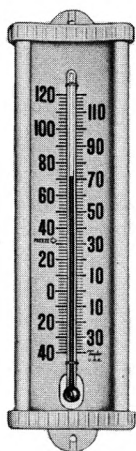
1309. ANEMOMETER, Direct-Reading. Wind velocity from 0 to 35 miles per hour or from 0 to 3,000 feet per minute is indicated on the scale of this convenient anemometer. The instrument is useful for measuring air speeds from fans, in model wind tunnels, and in other aerodynamic studies.

A vane, mounted within a light metal housing for protection, is turned by wind pressure against spring tension until the torques balance. It may be used as a continuously indicating meter or, by means of a trigger release, the vane and scale may be locked at any instant permitting the scale to be read later. By means of an adjustable handle, the face of the instrument is to be held at right angles to the wind direction. A zero adjustment is provided.

The instrument is 4 inches in diameter and is supplied in a leather carrying case. Instructions are included.

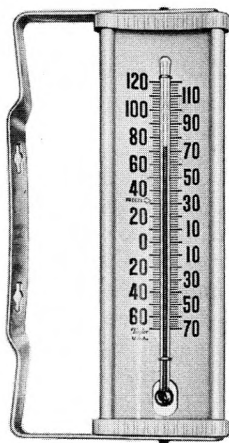
Each, \$53.00

THERMOMETERS



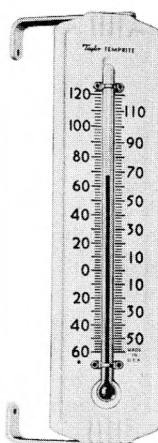
No. 1256.

1256. THERMOMETER, Fahrenheit, Mounted. Range: -68°F to 122°F . An easy-to-read thermometer with red liquid, mounted on a white-enameled plate 22.5 cm long. **Each, \$1.85**



No. 1257.

1256A. THERMOMETER, Indoor, Fahrenheit. Range: -30°F to 120°F . The magnifying tube and scale are mounted on an attractive Bakelite back 16.5 cm long. **Each, \$0.95**



No. 1257A.

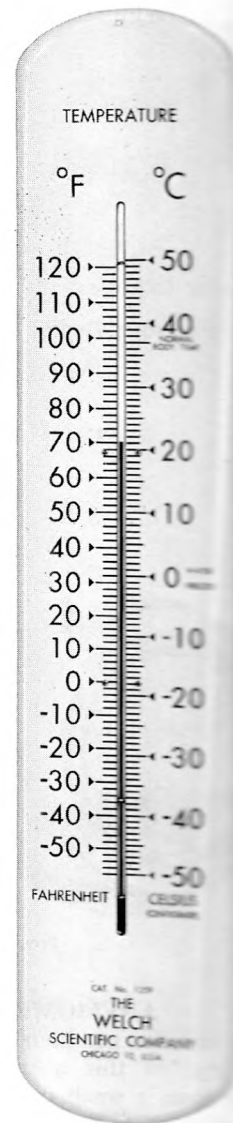
1257. THERMOMETER, Fahrenheit, Bracket-Mounted. Range: -52°F to 118°F . The white-enameled mounting plate of this thermometer has a bracket attached at top and bottom to hold it well away from the wall. It is 22 cm long. The red liquid is easy to read. **Each, \$1.98**

1257A. THERMOMETER, Outdoor, Fahrenheit. Range: -18°F to 120°F . The thermometer is mounted within a glass tube 2.5 cm in diameter held by a metal support. It may be turned to any direction and the magnified liquid column is easy to see. The over-all length is 24 cm. **Each, \$0.75**

Extra-Large
Wall
Thermometer
100 cm High

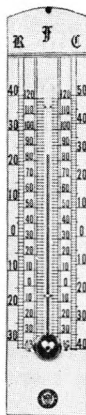
Legible
up to
40 feet

For
Indoor
or
Outdoor
Use



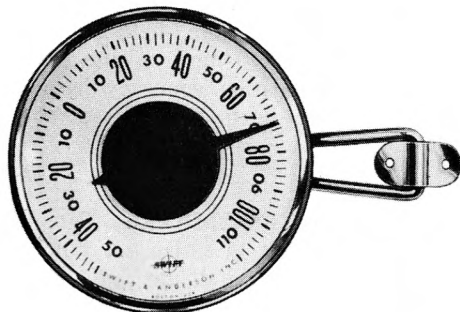
No. 1259.

1259. CLASSROOM THERMOMETER, F and C. This large thermometer, with a fully visible tube about 100 cm long, has bold red-and-black lines and numerals and a greatly magnified column of colored liquid to enable readings to be made up to 40 feet away. A Fahrenheit scale is on one side of the liquid and a Celsius (formerly called Centigrade) scale is on the other. The range is adequate for indoor or outdoor use, the latter requiring that for correct readings the instrument be protected from direct rain, snow, and sun. Use of several of these large thermometers in various locations is suggested. Over-all dimensions of the metal base are 20x100 cm. **Each, \$7.50**



No. 1260.

1260. THERMOMETER, Triple-Scale, C-F-R. This thermometer has a wood mounting 25 cm long with Fahrenheit, Centigrade, and Reaumur scales. It is used to compare temperature readings in the three systems. The red liquid is easy to see. The ranges are -40°C to 50°C , -40°F to 120°F , and -32°R to 40°R . **Each, \$1.80**



No. 1605.

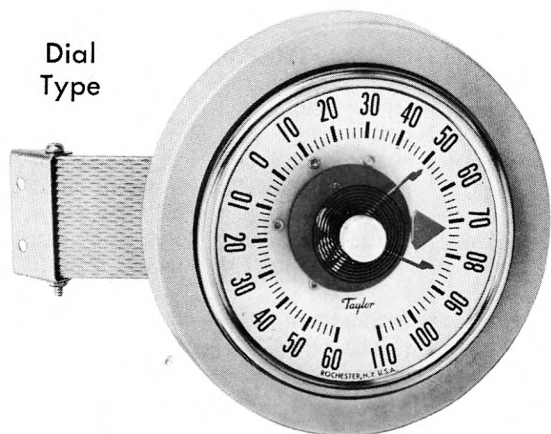
1605. THERMOMETER, Outdoor, Bimetallic. The 12-cm-diameter dial and large red indicator make this instrument easy to read. It has a range of -60°F to 110°F . A bracket for holding it 10 cm from the wall, facing any direction, is included. **Each, \$3.50**

See also

THERMOMETERS

In the Chemistry Apparatus Section

MAXIMUM-MINIMUM THERMOMETERS

Dial
Type

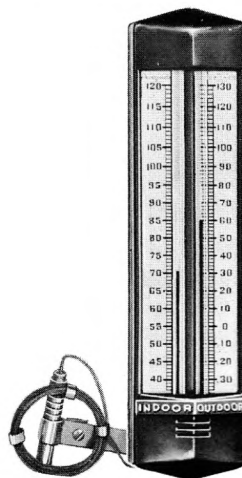
No. 1271.

1271. THERMOMETER, Maximum-Minimum (Taylor). For indicating the maximum and minimum temperatures reached since the previous setting. This is a most economical and practical instrument to mount in- or out-of-doors. The 3½-inch dial has a large easy-to-read scale and numerals. The large indicator, activated by a bi-metallic spiral, shows the correct temperature constantly and sweeps two smaller indicators, one clockwise to the maximum temperature and the other counterclockwise to the minimum temperature. They are returned manually to the main indicator by a knob in the center of the dial.

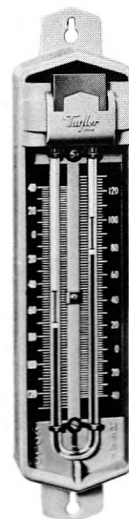
The plastic case has a glass over the dial and is equipped with a swivel-mounting bracket which locates the instrument 3½ inches from the wall. **Each, \$9.95**

INDOOR-OUTDOOR
THERMOMETER

1265. THERMOMETER, Indoor-Outdoor. Remote measurement of outdoor temperature is accomplished with this thermometer by means of a sealed metal bulb which is connected by a 42-inch fine metal capillary tube to the indicator indoors. The expansion of air is the temperature-measuring medium. The bulb is 2 inches long and ⅜ inch in diameter and is provided with a bracket with which it is to be mounted outside on a window frame. The capillary tube is a very rugged type widely used in industrial instrumentation. The range of the outdoor indicator is -60°F to 130°F and that of the indoor indicator is 25°F to 120°F. Both use a wide column of red liquid. The mounting is 9½ x 2½ inches. **Each, \$5.00**



No. 1265.

Mercury-
in-Glass
Type

No. 1274.

Reset with Magnet
Stored in Shelf at Top

1274. THERMOMETER, Maximum-Minimum. A U-shaped, mercury-in-glass type with metal floats at the top of each mercury column. One float remains at the maximum, the other at the minimum temperature. The floats are drawn down to rejoin the mercury column by means of a small magnet stored in a pocket in the upper part of the case. The range is from -40°F to +130°F. Over-all length, 10½ inches. **Each, \$12.95**

Callendar

Hugh Longbourne Callendar (1863-1930), English and Canadian thermometrist, was educated at Cambridge University in England where he was an outstanding student in mathematics and the classics. He was elected a Fellow of Trinity College, Cambridge, and worked in the Cavendish Laboratory. His investigations concerned the effect of temperature on the electrical resistance of metals.

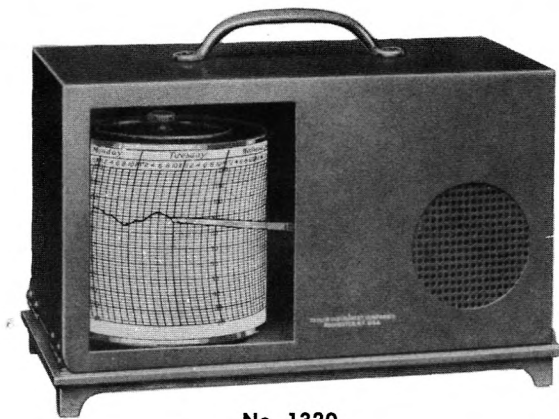
His greatest achievements were the development of the platinum resistance thermometer, which has become a standard of temperature measurement, and his investiga-

tion of the thermal properties of water and steam. Much of his work at Cambridge was done in collaboration with E. H. Griffiths, the modified Wheatstone Bridge used with a resistance thermometer being known as the Callendar and Griffiths' Bridge.

Later, Callendar came to Canada and held the Chair of Physics at Montreal University, Quebec. He did much further work in low temperature phenomena and on the critical point of many materials, continuous flow calorimetry, and the mechanical equivalent of heat.

RECORDING THERMOMETERS

For Permanent Temperature Records



No. 1320.

1320. RECORDING THERMOMETER, or Thermograph (Taylor). The Thermograph is an excellent bi-metallic thermometer element attached to a long indicating arm and ink stylus which continuously records the temperature on a chart mounted on a revolving drum. An eight-day, spring-wound clock mechanism within the drum drives the drum one revolution per week. The chart, to be changed once a week, is divided horizontally into 2-hour intervals and vertically into 2°F intervals from 0° to 100°F.

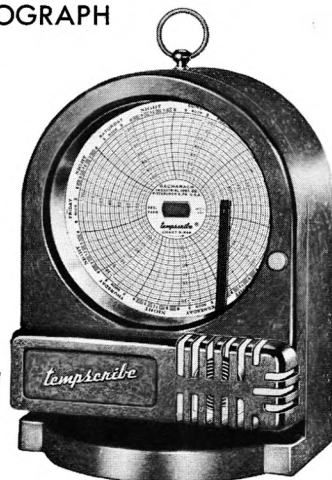
All parts are enclosed in a gray-enamel, metal case 26x13x16 cm high. The cover is hinged, has a carrying handle on top and a window in front, and is equipped with a padlock and duplicate keys. One year's supply of charts and a bottle of ink are included. **Each, \$175.00**

1322. REPLACEMENT CHARTS. For above Thermograph. Package of 52 charts (one-year supply). **Each, \$5.00**

PORTABLE THERMOGRAPH

Suitable for
Indoor or Outdoor
Recording

8-day Clock



No. 1323.

1323. RECORDING THERMOMETER, "Tempscribe." The Tempscribe provides continuous recording of temperature over a range of -30°F to 120°F on a dial chart covering a period of one week. It shows the extent of rise and fall of temperature, the rate of change, and the time the changes occurred. It can be used in- or out-of-doors, in refrigerators, or in other enclosures having the temperature controlled within the range of the instrument. Its construction is such that it will stand on a desk, can be hung on a wall, or can be conveniently carried.

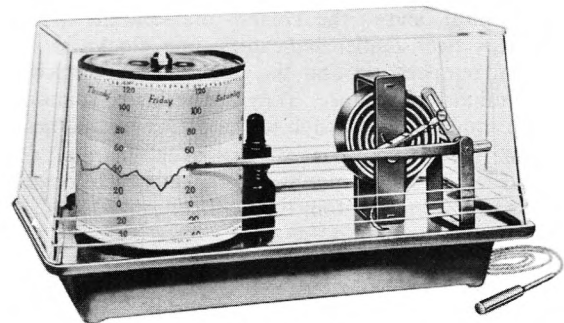
The unit consists of an 8-day, spring-wound clock movement, with revolving dial and reset knob, mounted in a brown plastic housing. The thermometer element and recording pen are mounted in a hinged door, the pen making contact with the chart when the door is closed. The chart is four inches in diameter and is visible through a glass window in the door. Over-all dimensions: 7½ inches high, 5¼ inches wide, 4½ inches deep. A bottle of ink and a box of 100 charts (two-year supply) are included.

Each, \$55.00

1323C. REPLACEMENT CHARTS. For above. Package of 100 charts (two-year supply). **Each, \$3.00**

ELECTRIC THERMOGRAPH

Remote Reading



No. 1321.

1321. RECORDING THERMOMETER, or Thermograph (Taylor). A continuous record of outdoor temperature is traced on an indoor chart by this electrically operated remote-reading instrument. The temperature-sensing bulb is connected to the recorder by an eight-foot armored tubing. The seven-day chart reads from -40°F to +120°F in 2° divisions. It shows present temperature at any time, high point and low point and the time at which they occurred. Over-all dimensions are 12x6x6 inches. Ink, a three months' supply of charts, and instructions are included. For operation on 115 volts A.C., 60 cycles. **Each, \$60.00**

1321A. REPLACEMENT CHARTS. For above Recording Thermometer. Package of 52 charts (one-year supply). **Each, \$5.00**

1326. INK, for Recording Devices. One-ounce bottle of blue ink. **Each, \$1.00**

RECORDING BAROMETERS

Are Listed on Page 886

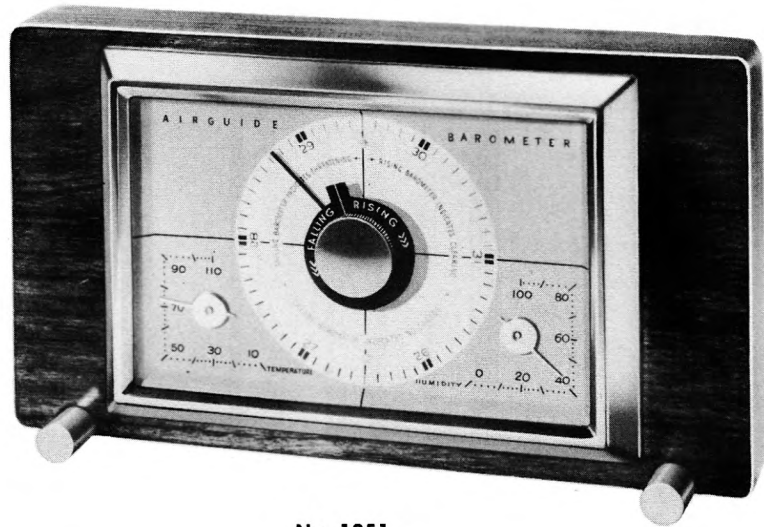
COMBINATION WEATHER INSTRUMENTS

AIRGUIDE TRIO

BAROMETER
HYGROMETER
THERMOMETER

In One Case

The Ideal Instrument for
The Instructor's Desk



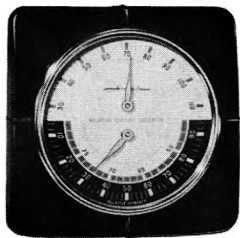
No. 1251.

INEXPENSIVE—ACCURATE—ATTRACTIVE

1251. AIRGUIDE TRIO. This is a barometer, hygrometer, and thermometer combined in a single attractive case particularly well suited for a desk. The barometer reads in inches and may be adjusted for altitudes up to 3,500 feet. It has an adjustable reference pointer to

indicate whether the pressure has risen or fallen since the previous reading. The two outer dials indicate temperature and humidity, respectively. Over-all dimensions are 9¼x2¼x5½ inches high. This instrument makes an ideal gift for any science teacher or student. **Each, \$15.95**

Temperature-Humidity Meters



No. 1279.

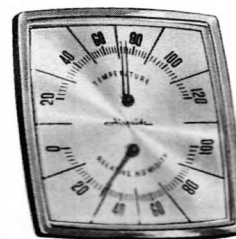


No. 1279A.

1279. HYGROMETER-THERMOMETER, Desk Model. The top scale shows room temperature and the bottom one the relative humidity and also the proper room temperature required for maximum comfort at that humidity. The case is 4 inches square. **Each, \$4.50**

1279A. HYGROMETER-THERMOMETER, Wall Model. Black plastic case with polished chrome trim. The lower face indicates relative humidity and the upper indicates temperature by means of a liquid thermometer 7⅞ inches high. **Each, \$5.00**

Every modern technique of designing, fabricating, stocking, and packing is used by Welch to bring you the best possible apparatus at the lowest possible price.



No. 1279B.

1279B. HYGROMETER-THERMOMETER, Desk Model. An attractive, inexpensive desk model with separate dials for temperature and humidity, 3½ inches square. **Each, \$2.95**

Dial-Type
Hygrometer



No. 1277A.

1277A. HYGROMETER, Wall Model. The long scale on this instrument permits more accurate readings of relative humidity. The case is 4⅝ inches in diameter and is formed of metal. **Each, \$6.00**

WET-AND-DRY-BULB HYGROMETERS

SLING TYPE

Matched Thermometers

1290. HYGROMETER, Sling Psychrometer. For rapid determinations of the wet-and-dry-bulb temperatures, from which the relative humidity can be derived using tables. Two thermometers, one with a wick attached to the bulb, are mounted on a wood base with a handle and swivel with which it can be whirled rapidly by hand. The results obtainable with this type are more accurate than those obtained with a stationary wet-and-dry-bulb hygrometer. Instructions are included. **Each, \$15.95**

MASON'S TYPE

Accurate Well-Ventilated Thermometers

1280. HYGROMETER, Wet-and-Dry Bulb (Taylor). The two thermometers are mounted with their bulbs well away from the back to provide unimpaird circulation of air. The reservoir for the wet-bulb wick is large enough not to require frequent filling. Over-all dimensions are 12x22x3 cm. A leaflet explaining relative humidity, an instruction booklet, relative humidity tables, and an extra wick are included. **Each, \$11.00**

COMPACT TYPE

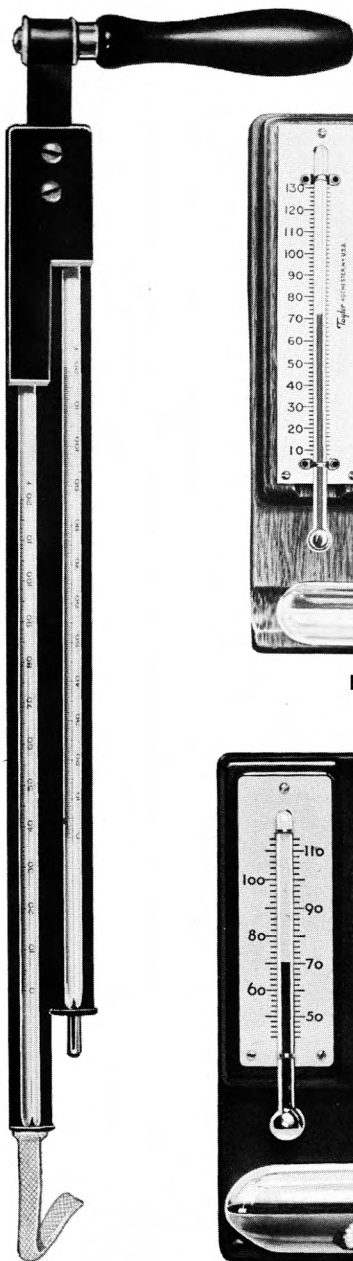
with

Built-In Relative-Humidity Scale

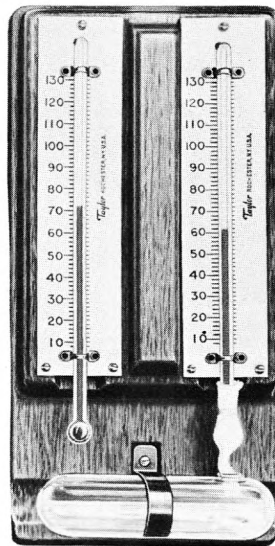
Eliminates Reference To Tables

1281. HYGROMETER, Wet-and-Dry Bulb (Taylor). This compact hygrometer has the two thermometers mounted on a plastic frame with a movable cylinder between them. Relative humidity can be read directly, thus eliminating reference to other tables. The over-all dimensions are 10x15x2.5 cm. **Each, \$10.00**

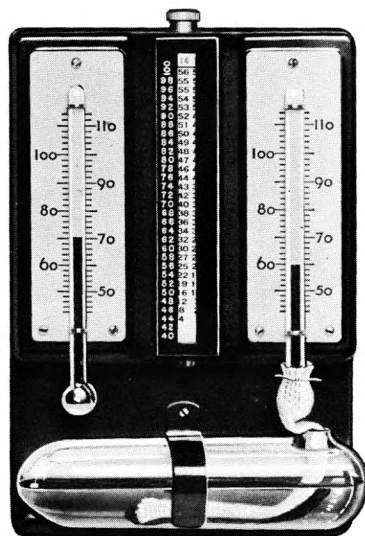
1288. WICK. Replacement for wet-and-dry bulb hygrometers. **Each, \$0.15**



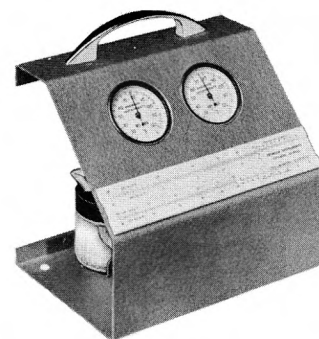
No. 1290.



No. 1280.



No. 1281.

DIAL
TYPE

No. 1293.

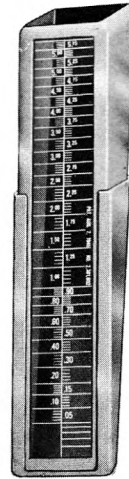
1293. HYGROMETER, Dial-Thermometer-Type. Two dial thermometers, one with a wick attached to its stem, provide the wet-dry-bulb temperatures. A sliding indicator mounted below the dials indicates percent relative humidity on its upper scale when the two thermometer readings are set in conjunction on the lower scales. No tables are needed. A large-capacity water reservoir for the wick is held within the metal support. The instrument may be mounted on a wall or will stand on a desk. It is 5x4½x6½ inches high. **Each, \$38.50**

DEW-POINT HYGROMETERS

See Page 157

RAIN GAUGES

1300. RAIN GAUGE. Up to six inches of rainfall can be caught and indicated by this all-plastic, weather-resistant gauge. The scale is permanently marked on the front surface. After a rain the reading is observed and the chamber emptied and replaced in the mounting bracket which is included. It is 13½ inches long with a top opening 2¼x2½ inches. **Each, \$3.95**



No. 1300.

All-Plastic
Rain Gauges



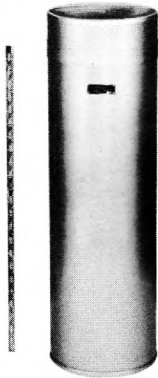
No. 1301.

1301. RAIN GAUGE, Cylindrical. This gauge will accurately measure up to 11 inches of precipitation to 0.01 inch. It is patterned after the Standard Weather Bureau type and is useful for illustrating how rainfall is measured as well as being a suitable instrument for school weather stations. It is made entirely of transparent plastic so that all parts are readily visible.

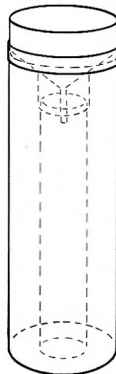
The rain gauge consists of a cylinder 110 mm in diameter, with a funnel which fits into the top and drains into an inner cylinder, graduated to show one inch of rain to the nearest 0.01 inch. When the inner tube fills, the outer vessel collects the overflow. The entire gauge is 38 cm high. A bracket for mounting, a five-year supply of precipitation record sheets, and instructions are included. **Each, \$19.95**

Weather Bureau Type

Made Entirely of Metal



No. 1304.



Showing
Internal Construction

1304. RAIN GAUGE, Weather Bureau Type. Made to U.S. Weather Bureau specifications, this durable, non-rusting, all-metal gauge consists of a funnel 20 cm in diameter fitting into the top of a cylindrical vessel of the same diameter. The latter contains a smaller vessel into which the funnel drains. The dimensions of the inner vessel and of the top opening of the funnel are such that one inch of rain will fill the inner vessel to a depth of ten inches.

A wood measuring stick, graduated on a 10 to 1 expanded scale and reading to 2.4 inches in 0.01-inch divisions, is included. The outer vessel serves to collect overflow in the event that rainfall exceeds the capacity of the inner vessel. It may also be used separately as a snow gauge. The over-all height of vessel and funnel is 66 cm.

Each, \$57.50

CLOUD DEMONSTRATION

Also Shows the Principle
of the Cloud Chamber

1730. CLOUD-FORMING APPARATUS. The conditions for cloud formation can be clearly demonstrated with this device. It consists of a glass bulb with two openings, one having a rubber bulb attached and the other a short length of rubber tubing with a tube clamp. To use it, it is first partially filled with water, smoke from a match is drawn into the space above the water, and the clamp is then closed. When the rubber bulb is compressed, then suddenly released, a cloud will form due to condensation about the smoke particles because of the sudden cooling. **Each, \$4.65**



No. 1730.