

SCIENTIFIC INSTRUMENTS  
LABORATORY APPARATUS  
AND SUPPLIES

*for*

Physics, Chemistry and  
General Science



CATALOG  
G

W. M. WELCH SCIENTIFIC COMPANY

*Manufacturers, Importers and Exporters*

1516 Orleans Street      Chicago, Illinois, U. S. A.

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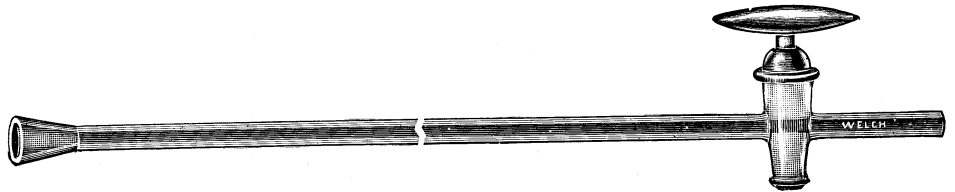
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## METEOROLOGICAL INSTRUMENTS



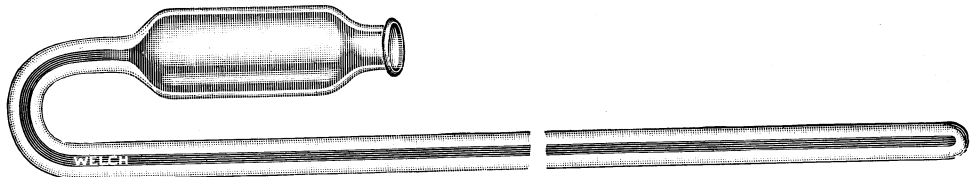
No. 1204.

5238. **BAROMETER TUBING, Heavy Wall.** This tubing has a bore 2 mm in diameter with 2.5 to 3 mm wall and is very useful for barometer work or for general use in the laboratory. Furnished in 5 foot lengths, 12 feet to a pound. Per lb..... 1.50
1202. **BAROMETER TUBE, Straight.** Same tubing as No. 5238. Cut in lengths of 90 cm which is sufficient for making a barometer. Both ends open, each..... .50
1204. **BAROMETER TUBES, Straight.** Same tubing as No. 5238, 90 cm long, sealed at one end ..... .50
1205. **BAROMETER TUBE, Straight Graduated.** Similar to No. 1204, except that tube is graduated in millimeters..... 2.00
1206. **BAROMETER TUBE, With Mercury Cup and Pipette.** Consists of Tube No. 1204, 90 cm long sealed at one end, with Mercury Well No. 5404 and pipette for filling the tube with mercury or for inserting a liquid in case the tube is used in vapor density experiments. Complete ..... .80



No. 1207.

1207. **BAROMETER TUBE WITH STOPCOCK.** This is a very convenient form of Barometer or Boyle's Law Tube. By slanting the tube and placing the open end in a cup of mercury, the thread of mercury can very easily be drawn up the tube past the stopcock. This can then be closed and the mercury will be trapped. A little care should be taken not to allow moisture-laden air from the mouth to go back into the tube. This provides a very rapid method for making the ordinary experimental barometer. Complete tube and stopcock, but without Mercury..... 2.50



No. 1208.

1208. **BAROMETER TUBE, Siphon Type.** Consists of an unfilled barometer tube same as No. 1204 except open end is with bend and bulb ..... .75
1210. **BAROMETER TUBE, Siphon Type, Filled.** Same as No. 1208 but filled with mercury ..... 6.00
5404. **GLASS MORTAR OR MERCURY WELL.** A convenient heavy glass vessel used as a mercury well. Capacity 2 oz. .... .55
- M1302. **VOLUME-COEFFICIENT TUBE.** According to Millikan, Gale and Bishop's Laboratory Manual, Exp. 14A. Consists of a capillary tube 40 cm long sealed at one end and containing an index of mercury 2 cm long..... 1.00
- M1363. **VOLUME-COEFFICIENT TUBE.** Same as No. 1302 except without mercury index. Open at both ends..... .35

**Torricelli**

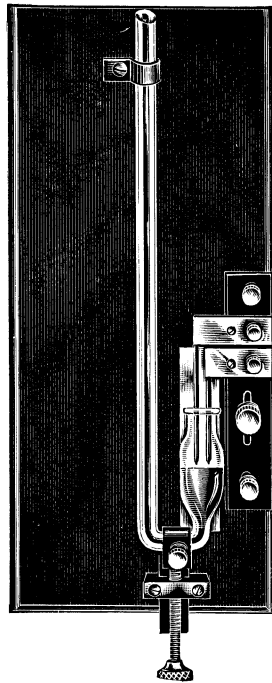
*Evangelista Torricelli (1608-1647), was an Italian mathematician, who studied and worked with the great Galileo and succeeded him as professor of mathematics at the Accademia of Florence. With the exception of the telescope, no scientific discoveries of the seventeenth century excited as much wonder and curiosity as did the barometer and the air pump.*

*By means of his classical experiment with a column of mercury, Torricelli was able to show that this column was the true measure of the weight of the atmosphere. His experiment was performed one year after Galileo died. The experiment was really carried out by a pupil of Torricelli, who never published an account of his research. At the time he was too much absorbed with some mathematical problems on the cycloid, and he died a few years later. He, however, did describe the experiment in two letters of 1644 to his friend Ricci in Rome, which have been preserved. He said in these letters, "My aim is not simply to produce a vacuum, but to make an instrument which shows the mutations of the air, now heavier and dense, and now lighter and thin." At the close of the letter he said, "My principal object is, therefore, not altogether successful . . . because the level (of the mercury) . . . changes for another cause which I never thought of, namely, by the heat and cold, and that very appreciably."*

*Pascal two years later amplified Torricelli's work by constructing a barometer using red wine as the liquid, thus illustrating that the height of the barometer varies inversely as the density of the liquid used.*



No. 1212. (3/4)



- 1212. **EXPERIMENTAL BAROMETER, Student Form.** With Electrical Zero-Point Attachment. This mercurial barometer is entirely exposed and is very convenient for demonstration purposes and student use. The whole column of mercury is visible. The scale is graduated in both English and Metric units reading by means of a vernier to 1/10 millimeter and 1/200th inch. The glass tube and cistern are filled with the best quality filtered and redistilled mercury. A thermometer graduated in Fahrenheit and Centigrade degrees is mounted on the base. The electrical attachment provides a convenient method of accurately locating the zero-point. Complete with electrical attachment, and thermometer mounted on a mahogany finished base ..... **22.50**
  
- 1212A. **BAROMETER.** Same as No. 1212, but without electrical attachment for setting the zero-point. The zero point line is scratched upon the mirror mounted on the support and by sighting across the meniscus of the mercury into the mirror and moving the screw clamp attached to the glass tube, the setting may be accurately made. With instructions..... **18.00**
  
- 1212B. **BAROMETER.** Same as No. 1212, but for use in high altitudes. Has a scale reading down to 20 inches and 50 cm..... **30.00**
  
- 1213. **BAROMETER.** Same as No. 1212, but equipped with rack and pinion adjustment for the vernier..... **27.50**
  
- 1214. **BAROMETER CASE.** For Barometers No. 1212 and 1213 inclusive. For hanging on the wall to protect the barometer and to prevent miscellaneous tampering with the instrument. Complete with lock and key..... **6.50**

1215. MERCURIAL BAROMETER, Improved Design. (Patent Pending.)

*Mercury column entirely exposed, diameter 4 mm*

*Straight form, Fortin type*

*New form of cistern with bakelite discs top and bottom. Molded glass cistern*

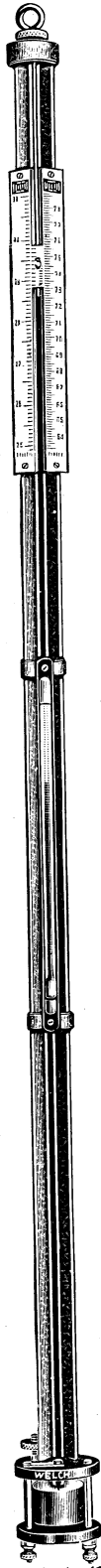
*Unique method of adjusting mercury to zero point by means of bakelite float*

*Electrical contact device for zero setting as part of the barometer*

*Individually checked with a certified Weather Bureau instrument*

*Vernier scale reading from 25 inches to 31 inches by 0.01 inches and from 60 cm to 83 cm by 0.1 mm*

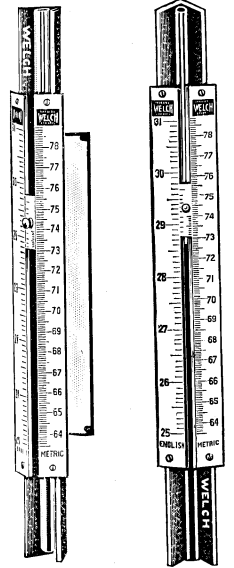
*Milk glass screen mounted in frame back of mercury column as aid to accurate setting of vernier*



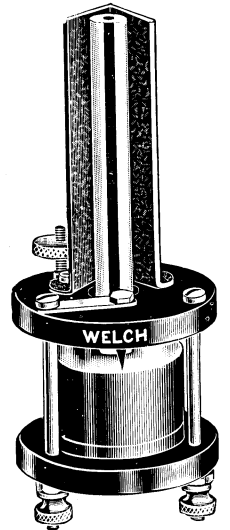
No. 1215 (1/7)  
Patent Pending

Each..... 27.50

The new barometer is of the standard Fortin type with a straight tube held firmly by a pressed metal case, open entirely in front which makes the mercury column visible over its entire length. From a teaching standpoint this is a decided improvement over the shut-in type because the student can at all times actually see the column of mercury which is being supported by the atmosphere. The barometer at the same time provides the advantages of the straight tube cistern type over the siphon type with bent tube. The frame is absolutely rigid, being made of sheet metal bent in a "V" cross-section with a formed cover fastened securely to the top and with the top bakelite cistern plate securely fastened at the bottom. The cistern is of unique construction, consisting of a molded glass vessel to contain the mercury securely held by bakelite discs at the top and bottom, the latter being held securely together by means of three rods. The change in level of the mercury is produced by a bakelite float which is raised or lowered in the mercury by means of a screw above the ceiling of the cistern. This furnishes a very delicate means of setting the mercury at the zero point of the scale. An electrical contact circuit for this zero setting is provided by means of two binding posts fastened to the bottom bakelite disc with the proper connections leading one terminal to the Monel metal zero pin and the other to the mercury through the rod which passes through the float. A milk glass panel is held behind the upper level of the mercury in a metal frame which provides a diffused light to aid in the setting of the vernier at the exact level of the mercury. Two wall brackets sent with the barometer can be screwed to the frame so as to provide a rigid and secure mounting on a wall if so desired. Black crystal finish throughout. Both English and Metric scales are provided with a vernier plate which is easily adjusted to any height, reading from 25 inches to 31 inches by hundredths of an inch and from 60 mm to 83 mm by tenths of a millimeter. This range is sufficient for all altitudes from sea level to 3,000 feet. An accurate Centigrade and Fahrenheit thermometer is provided for observing the temperature of the mercury column. The mounting is so designed that the tube can be shipped safely in a separate container and adjusted in position without difficulty by the operator.



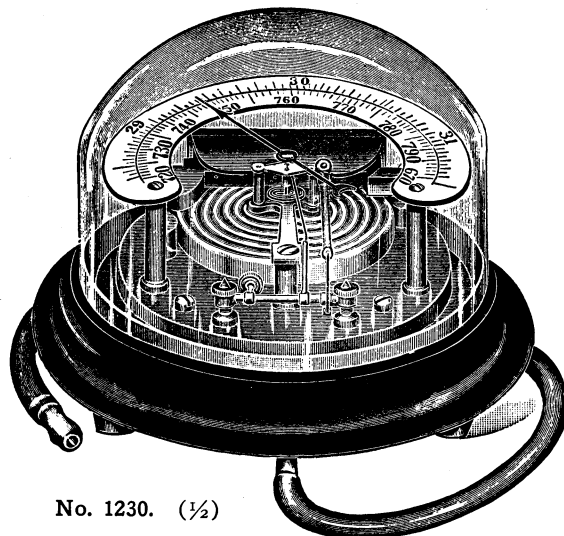
Side View  
Showing  
Milk Glass  
Plate



No. 1215  
Patent Pending

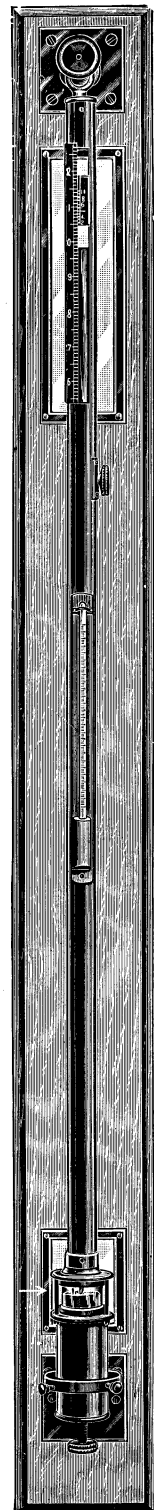
1218. **BAROMETER, (Green), Standard United States Weather Bureau Type.** This barometer is of the standard mercury-well, or Fortin Type which has been adopted as a standard in all laboratories and weather bureaus of the country. This type is used in the United States Weather Bureau and by the Smithsonian Institute for observations of highest accuracy. Barometer consists of a straight, heavy-walled, glass tube of uniform bore which has been filled with mercury with all air excluded and placed open end down in a cistern of mercury. The tube and cistern are supported and protected by a shell of brass in which two slits have been cut near the upper end so as to show the top of the mercury column. Fastened to the shell alongside the slits are metric and English scales with vernier plates reading to 0.1 millimeter and 0.01 inch, controlled by a rack and pinion. The portion of the shell opposite the surface of the mercury in the cistern has a glass window and the bottom of the cistern is provided with a thumbscrew which pushes against a diaphragm, thus raising or lowering the mercury in the cistern so that it will correspond exactly with an ivory point which is the zero of the scale. This zero-point is permanently fastened to the ceiling of the cistern casing. A double-scale thermometer is mounted on the casing so that the temperature of the barometer column may at all times be known. The scales read down to 25.5 inches and 65 centimeters so that this barometer will be satisfactory for observations from sea level up to approximately 3000 feet elevation. Complete as described except without board mounting shown in illustration .....

- 1220. **MAHOGANY BACK ONLY, For Holding Barometer No. 1218.** Consists of a mahogany board 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 milk-glass reflectors, forming an opaque background for reading the instrument..... 60.00
- 1222. **BAROMETER, Standard.** Same as No. 1218, except with scale extending low enough to measure barometric pressure at altitudes up to 5,000 feet.. 12.00
- 1224. **BAROMETER, Standard.** Same as No. 1218, except with scale extending low enough to measure barometric pressure at altitudes up to 8,000 feet.. 62.50
- 1226. **BAROMETER, Standard.** Same as No. 1218, except with scale extending low enough to measure barometric pressure at altitudes up to 12,000 feet.. 62.50
- 1228. **BAROMETER, Standard.** Same as No. 1218, except with scale extending low enough to measure barometric pressure at altitudes up to 18,000 feet.. 85.00



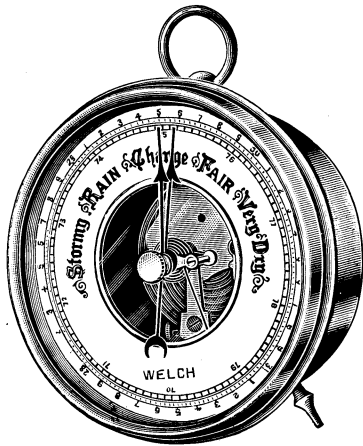
No. 1230. (1/2)

1230. **ANEROID BAROMETER, Demonstration Form.** This instrument is constructed in a manner similar to the form used by the United States Weather Bureau, but is designed principally to show the method of operation of an aneroid. Working parts are mounted on a wood base and can be clearly seen in every detail through a glass cover. One end of a rubber tube is connected to the pressure box and the other end terminates in a hard rubber mouthpiece. By blowing or sucking on this tube, the pressure within the box may be varied, each variation being shown by a change in the deflection of the pointer. Very valuable for demonstration work. Base 15 cm in diameter .....



No. 1218.  
With No. 1220  
Mahogany Back.

16.00



No. 1236. (1/2)



No. 1239. (1/3)

**ANEROID BAROMETERS**

1236. **ANEROID BAROMETER, Metric and English.** This low-priced, standard-grade instrument is made especially for schools. Mounted in a brass case with open dial to show the interior. It is graduated in both inch and metric units. Case is 10 cm in diameter. While we recommend the purchase of one of our precision barometers wherever possible, this instrument will record barometric pressure with sufficient accuracy for general laboratory use ..... 5.00
1239. **ANEROID BAROMETER, Metric and English.** This barometer is the one that we recommend all schools buy for routine use. The simple construction makes it more economical and at the same time dependable in its readings. Brass case 12 cm diameter with beveled glass cover. Open-faced dial, graduated in 1/10th inches and 1 millimeter. Front cover carries secondary hand which can be moved to any point desired..... 9.00



No. 1240. (1/3)

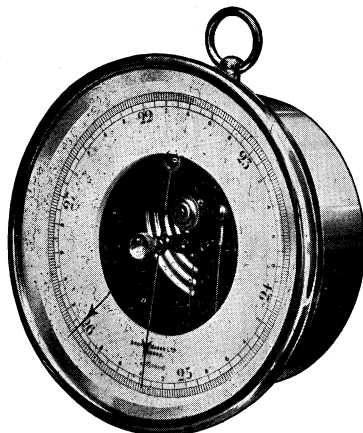


No. 1240, Showing Dial

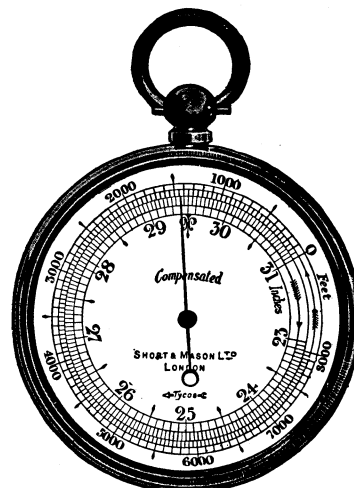
1240. **ANEROID BAROMETER, (Taylor).** High-grade, Adjustable, Metric and English. We recommend this barometer for physiographical laboratories because it is exceptionally high grade and it may be taken on field trips and will give very dependable observations. Durable built and will stand considerable rough usage. It is of somewhat higher grade than our No. 1239. One of the other features of this instrument is that it is adjustable for altitudes up to 3,500 feet by means of a dial on the back as shown in the illustration. To adjust, turn the brass disc on the back until the arrow on the case points to the altitude of the given location. The hand will then point to the proper reading at sea level, which reading will then be comparable with the United States Weather Bureau readings. This instrument is mounted in a lacquered brass case 12 cm in diameter with an enameled dial graduated in inches and permitting readings to 1/50th inch and 1 millimeter. Fitted with an adjustable stationary hand for marking the last position so as to note the rise and fall ..... 18.00



No. 1232.



No. 1244.



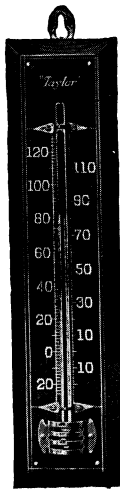
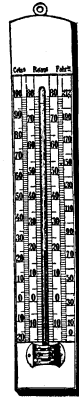
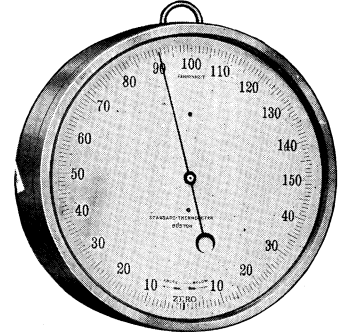
No. 1248.

1232. **ANEROID BAROMETER, (Taylor), Metric and English.** This is the standard form adopted by the United States Weather Bureau and the United States Navy. The movement is adjustable and compensated for changes in temperature. The case is of lacquered brass, 12 centimeters open dial with hand-silvered finish, graduated in inches to 1/50th inch and in centimeters to 1 millimeter, making it possible to obtain very accurate readings. Range from sea level to altitudes of 3,500 feet. This is our highest grade aneroid barometer ..... 20.00
1244. **ANEROID BAROMETER (Taylor). High Altitudes, Single Scale, English.** The construction of this barometer is very similar to our No. 1240, but does not have the adjustment for altitude on the back. Mounted in a lacquered brass case, 12 cm in diameter with open dial graduated in inches and with an adjustable stationary hand. The special feature of this instrument is that it is constructed to register low barometric pressure, that is from 20 to 26 inches by 1/50th inch, equivalent to altitudes of 4,800 to 10,600 feet above sea level ..... 18.00
1246. **ANEROID BAROMETER, (Taylor). High Altitudes, Single Scale, English.** Same as No. 1244, but for altitudes between 2,000 and 7,100 feet. Graduated in inches by 1/50th inch. .... 18.00
1248. **ANEROID BAROMETER, (Taylor). Pocket Type.** Watch case form, 5 cm in diameter, with a scale which indicates both altitude and inches of mercury pressure. The altitude scale will read up to 12,000 feet. This instrument is compensated for temperature change, is an exceedingly high-grade, well constructed instrument, and is recommended for travelers, surveyors and geologists. Its small form does not make it less sensitive as great care has been taken to produce a smaller and yet accurate instrument. In leather case ..... 27.00



No. 1249.

1249. **STORMOGUIDE, Aneroid Barometer, (Taylor).** A standard, high-grade, 12 cm dial instrument for elevations from sea level to 3,500 feet altitude. The special feature of this instrument is that technical information is etched on the face of the dial so that by noting the changes of barometric pressure accurate forecasting of weather can be done. The rising or falling of the barometric pressure and the rate of the rise or fall, and whether at high pressures or low pressures, determine weather changes. A key to all types of changes is given on the face of this barometer to make foretelling weather simple and easy. Predictions made with this instrument will follow very closely those made by the local U. S. Weather Bureau. The instrument is compensated for changes in temperature. With folding brass feet, antique finished brass case, and etched metal dial..... 25.00
- 1249A. **STORMOGUIDE, Aneroid Barometer, (Taylor).** Same as No. 1249 except the movement is not compensated for temperature, without folding feet, and with a white enamel printed dial..... 18.00

No. 1256.  
( $\frac{1}{4}$ )No. 1258.  
( $\frac{1}{2}$ )No. 1260.  
( $\frac{1}{2}$ )No. 1262.  
( $\frac{1}{4}$ )No. 1605.  
( $\frac{1}{2}$ )

## THERMOMETERS

1252. "WEATHER AND WEATHER INSTRUMENTS". This is a 164-page book containing information regarding the use of all weather instruments and describing application of principles for determining or predicting weather conditions and their effects. This text book is written so that the student may learn fully all the fundamentals of weather observations such as used in the Weather Bureau of the United States Government. Bound in imitation leather. 1.00
1256. THERMOMETER, Standard Grade. Mounted on a brass plate, which is fastened to a wooden back 25 cm long. Reads in Fahrenheit from minus 20° to plus 120°. Very good grade of house thermometer with exceptionally legible figures and with red permacolor liquid. 1.25
1258. HOUSE OR OUTSIDE THERMOMETER, (Taylor). A Fahrenheit thermometer reading from minus 40° to plus 120°. Mounted in a metal case which protects it on all sides from damage. Lens-shaped tube magnifies the column of mercury. 2.00
1260. THERMOMETER, For Comparison of Different Scales. This form is a standard form of mercury house thermometer, mounted on a wood back 25 cm long, with scales of Fahrenheit, Centigrade and Reaumur. This permits a comparison of the readings of the same temperature in three scales, thus effectively showing the method of changing temperatures from one scale to another. .75
1262. THERMOMETER, Standard, (Taylor). This is the standard form of United States Weather Bureau Thermometer 20 cm long. Has a cylinder bulb with an engraved stem. The tube magnifies the column of mercury making it very easy to read. Mounted on a brass support with binding screws for attaching to the wall or other support. Complete with certificate. 8.00
1605. THERMOMETER, All Metal. Commercial form of bi-metallic dial thermometer. The glass back shows the internal mechanism, making a valuable teaching piece and at the same time furnishing a serviceable temperature recorder. Dial is 12.5 cm in diameter. Range -50° to +150° Fahrenheit. 4.25

## Fahrenheit and Celcius

*Gabriel Fahrenheit (1686-1736), was a manufacturer of meteorological instruments and devised the Fahrenheit thermometer scale. He observed that liquids had fixed boiling points and later noticed that the boiling point varied with the changes in atmospheric pressure. Fahrenheit deserves great credit for first bringing about the general use of mercury in thermometers. In his first thermometers, using alcohol, Fahrenheit had for his zero the temperature of a mixture of ice, water and sal ammoniac; for his second point he used the temperature of melting ice—that is, 32°; and for the third point he used the temperature recorded by the thermometer in the mouth or arm-pit of a healthy person, namely 96°. Later when he began to use mercury in his thermometers his third point was made the boiling point of water which on his scale gave a temperature of 212°. Fahrenheit must have attained considerable celebrity because he was elected a member of the Royal Society of London in 1724.*

*Anders Celcius (1701-1744), a Swedish astronomer, occupied the chair of astronomy in the University of Upsala from 1730 until his death. He traveled extensively in Germany, Italy and France. Two years before his death, he advocated a Centigrade thermometer with fixed points at 0° and 100°. Curiously enough, however, he advocated that the temperature of steam under standard pressure be considered 0° and the temperature of melting ice 100°. This illustrates how an inventor, without any preconceived notions of a proposition, will set up conditions which seem almost absurd. The inversion of the scale, making the temperature of melting ice 0° and the boiling point 100° was effected by Stromer, a colleague of Celcius, 8 years later. The centesimal scale had been anticipated by Du Crest, a Swiss, but he used the temperature of the earth as his lower limit.*





No. 5670.

5670.	<b>THERMOMETER, Chemical.</b> Scale engraved on stem.			
	Length, inches.....	12	14	16
	Centigrade scale.....	-10° to +110°	-10° to +200°	-10° to +360°
	Each .....	1.25	1.75	2.25
5680.	<b>THERMOMETER, Chemical.</b> Same as No. 5670, with double scale.			
	Length, inches.....	12	14	16
	Range, Centigrade.....	-10° to +110°	-10° to +200°	-10° to +360°
	Range, Fahrenheit .....	-10° to +220°	-30° to +400°	-30° to +600°
	Each .....	2.00	2.50	3.00



No. 1621.

1621. **THERMOMETER, Ungraduated.** Filled with mercury and with sufficient length of stem for 100 degrees Centigrade but without graduations ..... **.90**



No. 1263A.

1263.	<b>ENGRAVED LABORATORY THERMOMETER, (Taylor).</b> -10 to +110 Degrees Centigrade in 1 degree divisions. Best quality thermometer glass, thoroughly aged. Calibrated for full immersion. Length 12 inches .....	<b>3.00</b>
1263A.	<b>ENGRAVED LABORATORY PRECISION THERMOMETER, (Taylor), Nitrogen Filled.</b> -10 to +110 Degrees Centigrade in 1/10th degree divisions. Length 24 inches....	<b>24.00</b>
1263B.	<b>ENGRAVED LABORATORY PRECISION THERMOMETER, (Taylor), With Certificate.</b> Same as No. 1263A, but with Certificate of Accuracy at 0, 50, and 100 Degrees Centigrade. Delivery requires three weeks .....	<b>27.00</b>



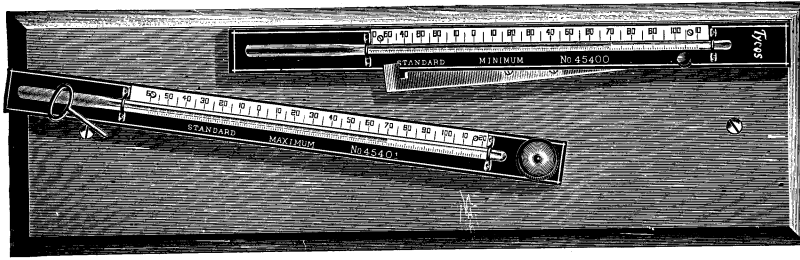
No. 5697.

5697.	<b>THERMOMETER, Beckman's.</b> The scale of this thermometer has a double range of 5° to 6° Centigrade, divided in 1/100° divisions. By a special contrivance at upper end a separation of any quantity of mercury can be made, thereby adjusting the thermometer for any desired temperature. Without certificate .....	<b>15.00</b>
5697A.	<b>THERMOMETER, Beckman's.</b> Same as No. 5697, with Bureau of Standards Certificate. Delivery requires four weeks.....	<b>30.00</b>
5698.	<b>THERMOMETER, Beckman's.</b> Same as No. 5697, but with auxiliary scale. With the auxiliary scale the thermometer can be quickly and accurately set to cover any desired range .....	<b>17.00</b>
5698A.	<b>THERMOMETER, Beckman's.</b> Same as No. 5698, but with Bureau of Standards Certificate. Delivery requires four weeks.....	<b>32.50</b>

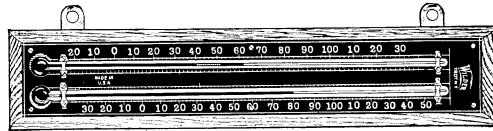


No. 1266.

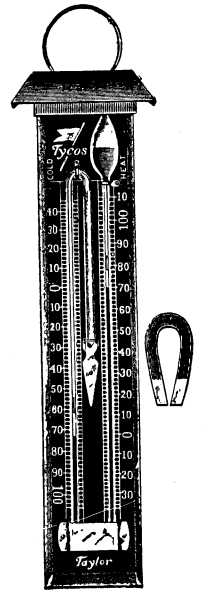
1264.	<b>SOIL THERMOMETER, (Taylor).</b> This thermometer has a wooden frame with a wooden handle. The bulb is so protected that the thermometer may be pushed down in the ground without injury. The protecting metal surrounding the thermometer is pointed so that it is easy to push the thermometer into the soil even though the soil be very compact. The thermometer tube is mercury filled and has a range of from 32° to 200° Fahrenheit .....	<b>3.75</b>
1266.	<b>SOIL THERMOMETER.</b> As used by the State Agricultural Experiment Stations, for ascertaining the temperature of the soil. Consists of a graduated thermometer enclosed in a wood case with stout stem. The upper front of the case is cut out for ten inches exposing the scale. Can be used at a maximum depth of 12 inches. Readings from 25° to 120° Fahrenheit. This instrument is durably built and can be depended upon for accurate results .....	<b>10.50</b>
1266A.	<b>SOIL THERMOMETER.</b> Same as No. 1266 except for use at a maximum depth of 24 inches .....	<b>13.00</b>
1266B.	<b>SOIL THERMOMETER.</b> Same as No. 1266 except for use at a maximum depth of 36 inches .....	<b>15.00</b>



No. 1268. (1/5)



No. 1273. (1/5)

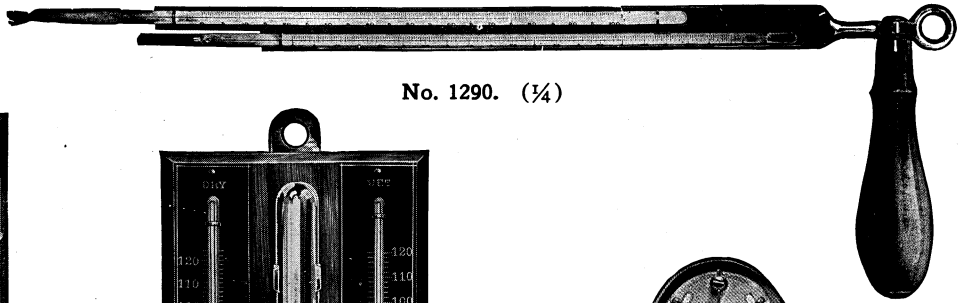


No. 1274. (1/5)

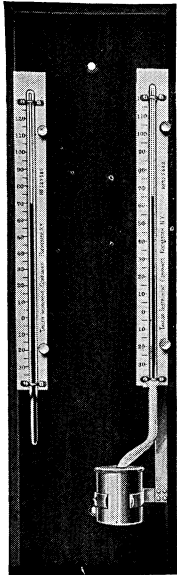
### MAXIMUM AND MINIMUM THERMOMETERS

- 1268. MAXIMUM AND MINIMUM SELF-REGISTERING THERMOMETER, (Taylor).** This is the adopted type of the United States Weather Bureau. Consists of one thermometer which marks the lowest temperature reached during a given time, while the other is a maximum thermometer and marks the highest temperature reached during the same time. The minimum thermometer must be mounted horizontally and contains a colorless liquid with a float. When this float is immersed in the liquid and touching the meniscus, it will be pulled down as the column recedes but will stay at the low point when the meniscus rises in the tube, thus registering the lowest point reached. The maximum thermometer is filled with mercury and the bore is arranged like a clinical thermometer with a constriction near the bulb which pinches off the mercury column when it starts to come down thus recording the highest temperature reached. Thermometers are furnished with certificates. Complete set mounted on a mahogany wood back, the thermometers being 27 cm long ..... 18.00
- 1270. STANDARD MAXIMUM REGISTERING THERMOMETER** Only of No. 1268 with certificate ..... 8.00
- 1272. STANDARD MINIMUM REGISTERING THERMOMETER** Only of No. 1268 with certificate ..... 8.00
- 1273. MAXIMUM AND MINIMUM SELF-REGISTERING THERMOMETER.** Similar to No. 1268 in the methods of registering temperatures but thermometers are not removable and no certificates are furnished. A very satisfactory instrument for ordinary laboratory requirements. Each thermometer is 30 cm long ..... 5.75
- 1274. MAXIMUM AND MINIMUM THERMOMETER, Six's Self-Registering.** Consists of a double-column thermometer with a long bulb filled with alcohol. The stem is partly filled with mercury which serves a double purpose—the ends of the mercury column give the readings for the thermometers at any time and push the indexes along the tube as the columns recede or advance, leaving these indexes at the minimum and maximum temperature points. Tube on the maximum side ends in a second smaller bulb which is only about half full of alcohol thus allowing some room for expansion. The minimum thermometer graduations read downward while the maximum thermometer graduations read upward like any ordinary thermometer. A small magnet is furnished with the instrument for drawing the indexes to the mercury surface by magnetic attraction..... 6.00

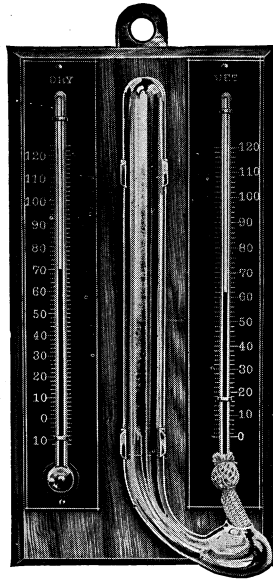
Note: Fractions after the illustration number indicate the relative size of the cut to that of the actual piece.



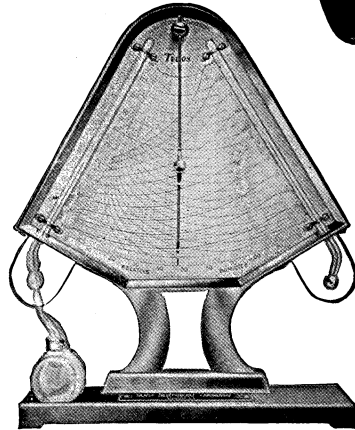
No. 1290. (¼)



No. 1286. (⅓)



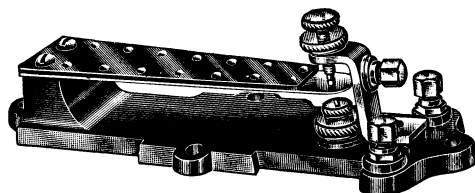
No. 1284. (¼)



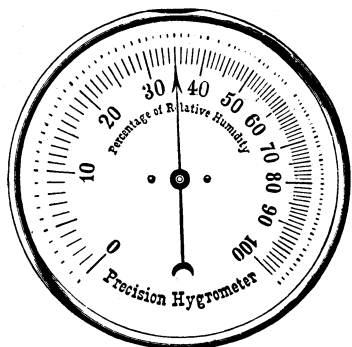
No. 1292. (⅓)

**HYGROMETERS**

- 1280. **MASON'S HYGROMETER, (Taylor).** For Determining Dew Point and Humidity. Consists of two thermometers set on brackets 2 cm away from a wood back 8x25 cm so as to give free circulation of air about the bulbs. One thermometer is provided with a wick over the bulb which is kept moist by water from a reservoir fastened below. Evidently, the more moisture in the air the less evaporation from this wet bulb and, therefore, by noting the difference between the readings of the dry- and wet-bulb thermometers and consulting tables which accompany the instrument, the humidity may be obtained. One of these instruments should be in every laboratory and school-room, so as to keep a check on the humidity in the room. Complete instructions with each instrument ..... 5.00
- 1282. **GLASS CISTERN** only of No. 1280 for holding the water for the wet-bulb thermometer. .75
- 1284. **MASON'S HYGROMETER.** Similar to No. 1280 but thermometers are not set out on brackets and water reservoir consists of a long bulb fastened between the thermometers. With instructions ..... 4.25
- 1286. **HYGROMETER, (Taylor).** United States Weather Bureau Type. This is an exceptionally high-grade form made of two No. 1262 Standard Thermometers mounted on a wood back 12x40 cm with a metal cistern and wick attached to one of the thermometers to keep its bulb moist. The accuracy of this set is second to none and each thermometer is furnished with a certificate so that any corrected reading may be absolutely depended upon for accuracy. With instructions ..... 21.00
- 1288. **SILK WICKS** for Hygrometers. Will fit any style of hygrometer listed above, each per dozen ..... .15  
1.50
- 1290. **HYGROMETER, or "Sling" Psychrometer.** Consists of the usual wet and dry bulb thermometers securely mounted on a metal plate which is free to swing about a wooden handle as an axis. When the instrument is whirled rapidly in the hand, the wet thermometer comes to a stationary condition more quickly than if it were to remain at rest. Much used in cold storage warehouses and other places where observations must be taken rapidly. Complete with instructions..... 8.00
- 1292. **HYGRODEIK, (Taylor).** This is an improved form of Mason's Hygrometer 30 cm high in which the wet and dry bulb thermometers are sufficiently separated to accommodate a curve chart from which relative and absolute humidities as well as dew-points may be read without the use of tables. An adjustable index swings across the scale and makes the observations easy. This is the type of instrument used by the U. S. Weather Bureau for making readings more rapidly and yet not in any way sacrificing accuracy. Full directions with each instrument..... 19.50



No. 1275A. (1/4)



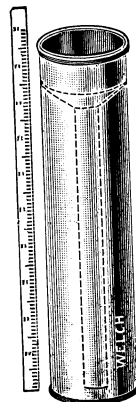
No. 1277. (1/3)



No. 1278. (1/3)

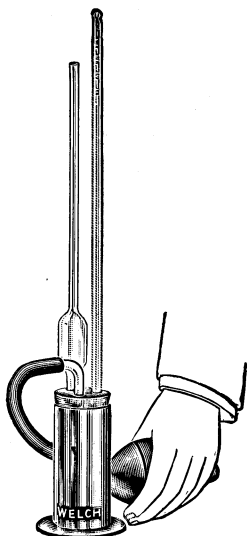


No. 1294. (1/3)

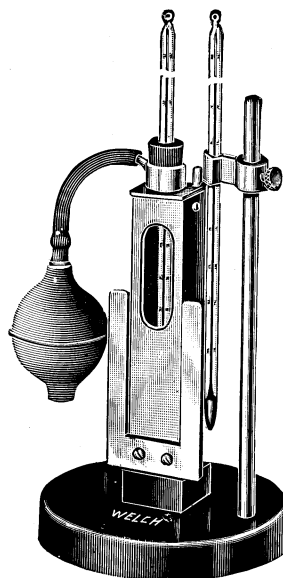


No. 1302. (1/6)

- 1275A. **THERMOSTAT, Adjustable.** Range minus 20° to plus 45° C. Consists of strips of ebonite and brass riveted together. By means of the adjustable terminals the thermostat may be set to complete the circuit at any desired temperature within its range. When properly installed it will ring an alarm bell to mark the desired temperature or to operate a relay so as to control heating units. Very useful in hot-houses, incubators or botanical laboratories for controlling, through a relay, banks of lamps or other heating units for keeping uniform temperatures. This makes a simple illustration of the bi-metallic thermostat for industrial uses. Mounted on an iron base 12 cm long..... 3.00
1277. **HYGROMETER, Hair Form.** This is a standard form of hygrometer made upon the principle of the variation in the length of a hair under different conditions of moisture. The scale is graduated so as to record percentages of humidity from 0 to 100 without reference to tables. Entire instrument mounted in a lacquered brass case 14 cm in diameter ..... 7.25
1278. **HYGROMETER, Spiral Form.** Similar in use to No. 1277. Graduated in percent of humidity and also marked so as to show whether the air is moist, normal, dry, or very dry. Mounted in a nickel-plated case 8 cm in diameter. The most convenient form of Hygrometer for routine observations of humidity in the school room..... 3.00
1294. **WOLPERT'S AIR TESTER, or Carbacidometer.** This instrument is used for obtaining the per cent of carbonic acid gas in the atmosphere. It has a capacity of 50 cc and is graduated to 0.5 cc and also gives percentages of CO<sub>2</sub> direct, thus doing away with all calculations or use of tables. The entire instrument is small enough to fit in the pocket, being 15 cm long. Complete with 2 cc glass dropper, full directions for using and test solutions for making a number of tests..... 4.50
1296. **EXTRA CHEMICALS for No. 1294.** Capsules of 139 mg sodium carbonate and 75 mg phenolphthalein only. Other chemicals needed are hydrochloric acid and ethyl alcohol, which are usually part of a laboratory equipment or can be purchased locally..... 1.00
1302. **RAIN GAUGE, United States Weather Bureau Type.** This instrument is made according to the United States Weather Bureau specifications but is smaller than No. 1304. Consists of a zinc can 7 cm in diameter and 30 cm high. Fitted into this can is a copper cylindrical vessel 7.9 cm in diameter with a funnel leading into a brass tube closed at its bottom end and having exactly 1/10th the cross-section of the copper vessel. The rain entering the copper vessel is collected in the bottom of the tube and the rain fall is measured directly to 0.01 inch by means of a wood scale properly graduated for this purpose. With instructions ..... 4.00
1304. **RAIN GAUGE, Standard United States Weather Bureau Specifications.** Same as No. 1302 but standard size, 20 cm in diameter and 60 cm high ..... 13.00



No. 1723. (¼)



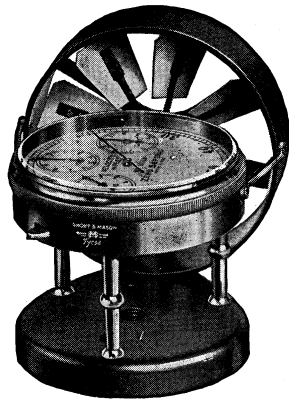
No. 1726. (¼)

### DEW-POINT APPARATUS

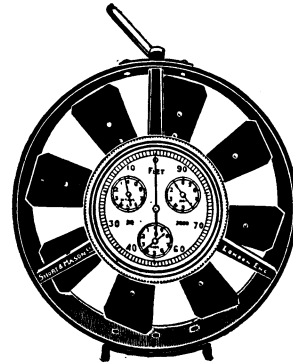
1723. **DEW-POINT APPARATUS, Simple Form.** According to specifications of Millikan, Gale and Bishop, Exp. 10A. A nickel-plated cylinder 6x3 cm is provided with an aspirator bulb and inlet and outlet tubes. By passing air through ether or other volatile liquid in the cylinder, the temperature may be gradually lowered until a cloudiness appears on the polished nickel-plated surface. This is the dew-point and its temperature may be determined by a thermometer. A very convenient and rapid method for determining dew-point. Complete with instructions but without thermometer..... 1.00
1726. **ALLUARD DEW-POINT APPARATUS OR HYGROMETER.** Made according to specifications of Millikan's, "Mechanics, Molecular Physics and Heat," page 167. Consists of a thin-walled, polished nickel-plated brass vessel, provided with inlet and outlet tubes, and a window for viewing the thermometer. On the sides of the vessel but not in contact with it, are polished, nickel-plated brass strips. When ether is placed in the vessel and air passed through it by means of an aspirator bulb, the rapid evaporation causes cooling and the very first cloudiness from condensation of moisture on the outside of the vessel can be detected by comparison with the upright strips. Supports are provided for holding one thermometer in the vessel and one thermometer entirely separated from the vessel for recording the room temperature. Complete with aspirator bulb but without thermometers..... 12.50

### Weather Bureau Organization

*The Weather Bureau of our Government is a wonderful organization which functions entirely for the benefit of trade, commerce, and the citizens of the country. \$1,500,000 is spent annually by the Government on its weather bureau, as much as all the countries of Europe put together. It has 211 meteorological stations and, besides making observations and reporting to central forecasting stations, the Weather Bureau sends 100,000 telegrams and messages within two hours at certain times whenever changes in weather conditions threaten the country, in order to fully protect shippers and fruit and produce growers. The sending of these telegrams have on single occasions saved the country's crops to the value of three to four million dollars. Besides these emergency messages, the Bureau sends out daily 80,000 telegrams, maps, and bulletins to subscribers and different agencies. It is on the records that not a single storm has swept across the United States or up and down its coast lines which has not been predicted hours and maybe days before. The value of this service to the country is inestimable.*

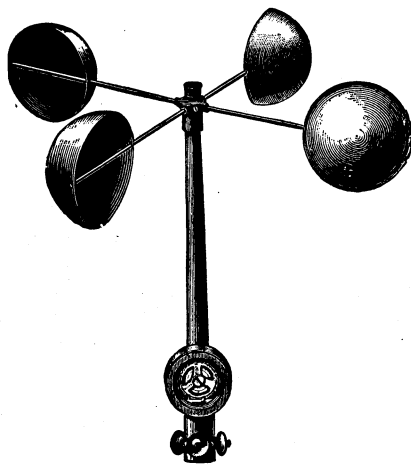


No. 1306. (½)

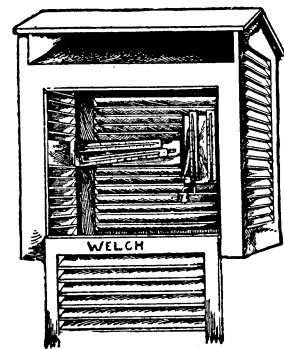


No. 1308. (½)

1306. **ANEMOMETER, Portable Form. (Taylor).** For measuring velocities of air currents in buildings, etc. Indications are obtained by means of a delicately poised fan wheel 7 cm 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 joined socket holder, zero-setting device and disconnecter. In sole-leather case ..... 88.00
1308. **ANEMOMETER, Biram's Type. (Taylor).** This is a simpler form of instrument than our No. 1306. Consists of a fan 10 cm in diameter with a four-dial, jewel-bearing movement mounted on the same shaft. Reads up to 100,000 feet, and will measure air currents from 100 feet to 3000 feet per minute. Complete with instantaneous zero-setting device, threaded socket for attachment to foot and with calibration chart. Without case ..... 60.00

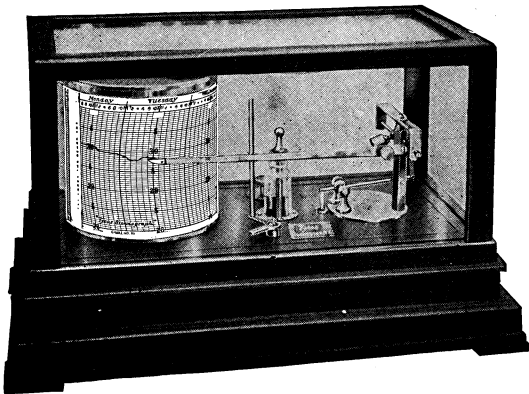


No. 1310. (½)

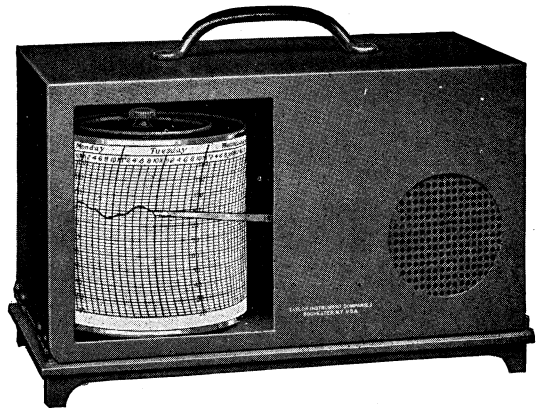


No. 1311. (½)

1310. **WIND GAUGE, or Anemometer.** For indicating the velocity of wind in miles per hour. Consists of a vertical shaft on the upper end of which are four 25 cm arms with hemispherical cups, which always turn in one direction, regardless of the wind. The dial is arranged to show wind velocities from 1/100th of a mile up to 10,000 miles, and then repeat. Miles per hour can be found by taking readings at the beginning and end of a 10 minute interval and multiplying by six ..... 42.00
1311. **SHELTER, United States Weather Bureau Type.** Consists of a housing for weather instruments, size 70 x 62 x 42 cm. Front and both sides are ventilated, thus furnishing for these instruments, as near as possible, the exact outside conditions and yet giving protection from any possible damage. Very desirable in the Physiography Field Laboratory for protecting instruments. Provided with lock and key ..... 32.50



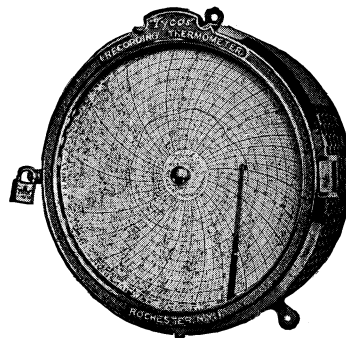
No. 1316. (1/2)



No. 1320. (1/4)

### PRESSURE AND TEMPERATURE RECORDING INSTRUMENTS

- |       |  |       |
|-------|--|-------|
| 1316. | <p><b>BAROGRAPH, Recording Barometer. (Taylor).</b> This is a high-grade aneroid barometer with long indicating arm which traces the variations of the barometer pressure on a chart mounted on a revolving drum. As a clock mechanism drives the drum exactly one revolution per week, record charts need be changed only once a week. All parts enclosed in a dust-proof, glass-covered mahogany case 31 x 18 x 16 cm. For altitudes from 0 to 3500 feet. Complete with year's supply of charts and bottle of ink. With instructions</p>   | 75.00 |
| 1318. | <p><b>BAROGRAPH CHARTS.</b> One box containing a year's supply for barographs reading from 28 to 31 inches.....</p>  | 3.50  |
| 1320. | <p><b>THERMOGRAPH, Recording Thermometer. (Taylor).</b> Consists of a bi-metallic thermometer coil to which is attached a long arm which changes position as the thermometer coils and uncoils with the changes in temperature. Charts on the revolving drum are graduated for a week's temperature record in day and two-hour subdivisions, the horizontal graduations being in degrees. Used by the United States Department of Agriculture. All parts enclosed in gray-enamel, metal case, 25 x 16 x 12.5 cm with handle. Complete with bottle of ink and full instructions .....</p> | 55.00 |
| 1322. | <p><b>THERMOGRAPH CHARTS.</b> Box containing a year's supply of charts, range from 0 to 100 degrees Fahrenheit .....</p>   | 3.50  |
| 1326. | <p><b>INK, For Barographs and Thermographs.</b> 1 oz. bottle.....</p>  | .60   |



No. 1328. (1/2)

- |       |  |       |
|-------|--|-------|
| 1328. | <p><b>THERMOMETER, Self-Registering. (Taylor).</b> This instrument records the variations of temperature with time and is very useful in green-houses or Botanical Laboratories in which it is necessary to keep the temperature approximately constant and to have a record of the temperatures during any interval of time. This is a very accurate instrument, ranging from zero to 130 degrees Fahrenheit in 2 degree divisions. The chart is sufficient for 7 days running. The case is 30 cm in diameter. Weather-proof finish with hinged front and lock. Complete with 100 charts and ink.....</p> | 63.00 |
|-------|--|-------|