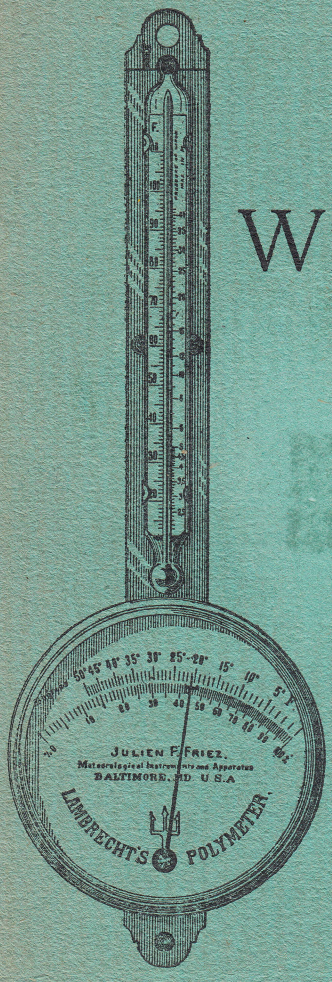
Isaac H Vrooman Jr.

Circular P.

HUMIDITY

AND

WEATHER FORECASTS.



THIRD EDITION.

June 1st, 1895.

PUBLISHED BY
JULIEN P. FRIEZ,
BALTIMORE, MD.,
U. S. A.

Price: 10 cents.

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June-18-'95

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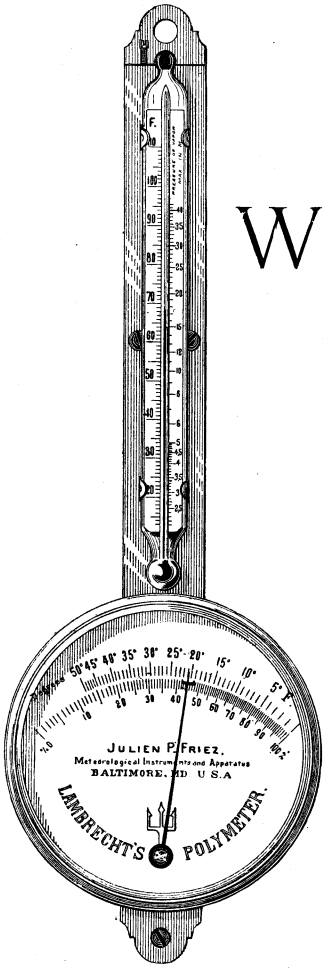

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THE FRIEDENWALD CO., PRINT,
BALTIMORE, MD.

HUMIDITY:

WHAT IS IT AND HOW IS IT MEASURED?

HUMIDITY is that condition of the air with regard to the amount of invisible vapor it contains. The amount of humidity is generally expressed in per cent., or on a scale of 0 to 100, and is said to be *high* when the air is damp and the range is from 65% to 100%, and *low* when the air is dry or there is less than 40%. A simple experiment, which any one can perform, will illustrate the presence of humidity. Pour cold water into a glass and its outside surface will soon become covered with condensed moisture. This moisture has not oozed through the glass, but is the deposit of the invisible vapor in the air surrounding it. In winter the same phenomenon will occur in rooms where many persons are assembled. The moisture from their lungs and bodies will be condensed on the glass of the windows by the outside cold, and the air in such rooms is said to be oppressive. The temperature of the surface upon which condensation *commences* is called the *dew point.*

Humidity is measured and recorded as if there were two kinds: *Absolute* and *Relative.*

*"*Absolute and Relative Humidity.* In order to measure the relative dryness or dampness of the air, it is customary to determine the ratio of the amount of vapor actually present to that which might be present at the existing temperature. The amount of vapor actually present is called the *absolute humidity.* This may be expressed either in the expansive force that the vapor exerts or in its weight in grains per cubic foot of air. The absolute humidity divided by the amount of vapor that might exist if the air were saturated gives a ratio that is called the *relative humidity.*"

*"An amount of vapor sufficient to cause a high relative humidity at a low temperature would cause only a low relative humidity at a high temperature. An amount of vapor that is sufficient to produce only about 25 per cent. relative humidity at a temperature of 80°, will suffice to saturate the air when its temperature falls to 40°. With a given absolute humidity, the relative humidity will fall as the temperature rises, and *vice versa;* as the air warms during the morning the relative humidity falls, but towards sunset, when the air cools, the relative humidity rises again."

---

*Paragraphs marked * are extracts from Davis' "Elementary Meteorology," Boston, 1893, and are given here by *special permission* of the author, Prof. Wm. M. Davis, of Harvard University, Cambridge, Mass.

The Dew-Point is that temperature either of the air or of solids about us at which the condensation of moisture commences.

*"When the air is cooling from noonday heat to evening cold, its capacity for vapor is constantly decreasing. At noontime the amount of vapor present seldom satisfies the capacity, and the air then commonly has with us a relative humidity of fifty to eighty per cent.; but with the afternoon fall of temperature and decrease of capacity, the vapor present approaches and finally reaches the stage of saturation; the temperature is then said to have fallen to the dew-point. Any further cooling will cause condensation and produce cloud, fog, dew or frost. The difference between the temperature of the air and the dew-point is called the complement of the dew-point."

Any condensation occurring above a temperature of 32° Fahr. will, of course, produce water or dew, but if *below* the freezing point, this is deposited as ice and in the form of frost, hail or snow, depending upon the prevailing conditions of temperature and moisture.

The average percentage of moisture of the air is from 60 to 70 per cent. If the air has less than 60 per cent. of moisture it draws water; if it has more than 70 per cent. it tries to avoid a thorough saturation and gets rid of the moisture by condensation. It is not practicable to explain here the causes of this phenomenon; suffice it to say that there is no element or condition of the atmosphere which exercises such a strong control over our bodily sensation of the temperature of the air as humidity. The reason for this is that our bodies do not act like a thermometer, which readily adapts itself to the temperature of the air immediately surrounding, but endeavor to maintain an even "blood heat" temperature at all times and under all conditions of health. This temperature is about 98° F., and it is most remarkable what slight variations there are under the extreme conditions under which the human race exists. In the Arctic regions the inhabitants have been known to endure temperatures as low as 90° below zero Fahr., while in the tropics an air temperature in the shade of 120° is not infrequent.† We therefore see the human race existing under a range of temperature amounting to 210°, which would be impossible were it not for the all-wise provision of nature which tempers by never-varying laws the amount of humidity present. As Prof. Wm. M. Davis, in his new book, "Elementary Meteorology," truly states:

† The lowest temperature ever recorded on the earth, up to the present time, was that taken at Werchojansk, in Central Siberia, January 15, 1885, when the thermometer indicated 90 degrees below zero Fahr.; the highest temperature ever recorded was 124 degrees above zero Fahr. in Algeria, Northern Africa, July 17, 1879. The extreme range of temperature as recorded for the United States is from 64 degrees below zero, in winter in North Dakota, to 114 degrees above zero in summer in Arizona.—*From Official Meteorological Reports.*

*"We prevent an uncomfortable reduction of temperature in cold air by sheltering the body from loss of heat by a covering of clothing; if the air is windy, more protection is needed than when it is calm; if it is damp as well as cold and windy, it abstracts all the more heat from us, probably by means of the better conductivity given both to the air and to the clothing by the moisture; hence the difference between the bracing though severe cold of our dry northwest winter winds, and the penetrating searching chill of our damp winter northeasters. The difference between the so-called 'dry cold' of the interior (of the United States) and the 'damp cold' of the New England coast is thus explained. On the other hand, when the air is warm, our bodily temperature would rise too high if it were not for the cooling of the skin by continual evaporation from its surface. In very hot and very dry air, the evaporation is so much hastened that the skin is parched and burned; in hot and very damp air, evaporation is checked and the air feels sultry and oppressive. Moderately dry hot air is less uncomfortable than at either of the extremes of dryness or dampness. The oppressiveness of our 'dog-day' weather in July and August depends as much on its humidity as on its heat."

The necessity of a sufficient amount of humidity for the proper growth of vegetation and crops is recognized by every one, from the humblest farmer to the scientific grower of delicate hothouse plants and flowers. The luxuriant growth of every kind of vegetation in the tropical regions is possible only by the constantly high relative humidity present, which furnishes the necessary moisture. The severe droughts, and early and late frosts, that sometimes visit certain sections of our own United States, and cause such heavy loss to farmers, fruit-growers and transportation companies, are accompanied by conditions of very low per centage of relative humidity. Man has not yet discovered the cause of these mighty and constantly varying changes in our atmosphere, and it is beyond question that these forces of nature can ever be made obedient to our wishes.

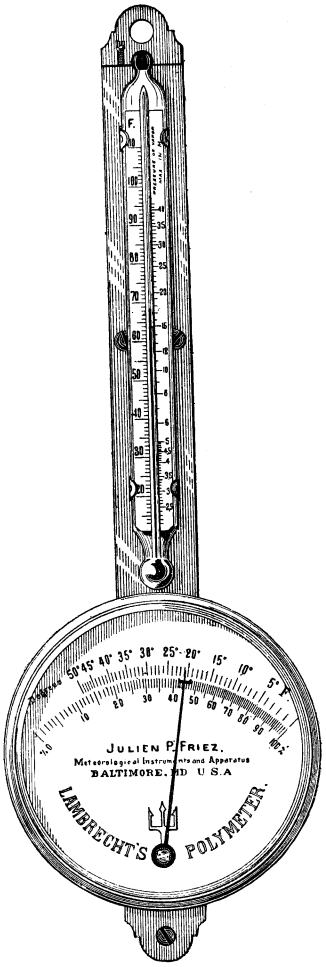
We observe, therefore, how intimately the subject of *humidity* is associated with our daily lives and prosperity, and, to the *wise* man who "takes time by the forelock," and who "strives to read afar off the secrets of nature," to enable him to guard against the ever-changing conditions of our climate, the question arises: *How can this important meteorological element, humidity, be indicated and measured?*

THE ANSWER IS that this matter has received full consideration by the best scientists and inventors of our age and we have numerous forms of apparatus from which information may be obtained. These instruments are known as *Hygrometers*, and we have the Standard Hygrometer, Sling Psychrometer and Whirling Apparatus of the U. S. Weather Bureau (all of which require special tables for reducing the observations). But the

latest and *best* instrument for all general purposes is the now celebrated LAMBRECHT'S PATENT POLYMETER, which is fully described on the following pages.

Baltimore, Md., May 1, 1895. JULIEN P. FRIEZ.

THE POLYMETER.



(Pattern No. 22.)

Description. The Polymeters are constructed of brass or bronze, about 9 inches long, with a 3-inch dial, having engraved

thereon a scale indicating relative humidity and dew-point figures, and Mr. Lambrecht says that it is a far better constructed instrument than any of his former hair hygrometers, and he feels assured that some of his Polymeters will exist and indicate as correctly as to-day in a hundred years hence. A standard thermometer is also attached, as indicated in above illustration.

The bronze instrument is more suitable for outdoor exposure, and makes a handsomer appearance than the one in brass.

In regard to durability the instrument is well constructed, with the utmost care and attention to scientific accuracy.

Lambrecht's Patent Polymeter gives the following meteorological conditions of the atmosphere:

(1) Temperature.
(2) Relative Humidity.
(3) Dew-point.
(4) Absolute Humidity in Vapor Pressure.
(5) Absolute Humidity in Weight of Vapor.

(1) TEMPERATURE. The thermometer on the stem of the Polymeter gives the current temperature of the air in Fahrenheit degrees, the same as any standard mercurial thermometer.

(2) RELATIVE HUMIDITY is the percentage of moisture in the atmosphere at any degree of temperature. The Polymeter indicates this by the index-hand on the dial, *zero* (0) being extreme dryness, and 100 extreme saturation, or the air filled with moisture. The quantity of vapor which completely saturates the air at 32 degrees, on having its temperature raised to 50 degrees, becomes only one-half saturated, and the index of the Polymeter will point to 50 per cent.; on a further rise of temperature to 70 degrees, the amount of vapor remaining the same as at 32 degrees, the index-hand will point to 25 per cent. or one-quarter saturation, which is too dry for human health or plants.

(3) DEW-POINT. To obtain the Dew-point, it is necessary to read the number on upper scale of dial *above* the index-hand, and deduct it from the temperature given by the thermometer of the Polymeter. The result is the dew-point, or the temperature at which the air becomes completely saturated and dew deposits. For example: if the temperature by the thermometer is 77 degrees and the hand of the Polymeter points at 20 on the upper scale, deducting this number from 77 degrees, the temperature 57 degrees remains; that is, if the temperature falls from 77 degrees to 57 degrees, the watery vapor of the atmosphere will deposit as dew, fog, cloud or rain; if the temperature of the dew-point should be below 32 degrees (or freezing), then there will be hoar-frost, hail or snow.

(4) ABSOLUTE HUMIDITY IN VAPOR PRESSURE is understood to be the pressure exerted by the invisible vapor of the air on the mercurial column of the barometer. Every degree of temperature has its own maximum vapor pressure, as indicated on the scale to the right of the thermometer scale; thus, 46 degrees is 8 millimeters, 79 degrees is 25 millimeters, 94 is 40 millimeters. The actual force of vapor at any given degree of temperature can be calculated by multiplying the maximum pressure, as is shown on the right side of the thermometer scale, by the percentage of relative humidity of the Polymeter on the lower scale of the dial. As, for example, if the temperature is 77 degrees, on the right hand side of the scale the maximum force of vapor is 23.5 mm. If the relative humidity is 72 per cent., then 23.5 mm. $\times .72 = 16.92$ mm., which is the actual force of vapor. Having thus found the force of vapor, the dew-point can be obtained by reading the temperature opposite the force of vapor, 16.92 mm., on the thermometer scale, which is 67 degrees.

(5) ABSOLUTE HUMIDITY IN WEIGHT OF VAPOR. It is sometimes interesting to know the *weight* of vapor contained in a cubic meter, or the weight of moisture in a room. By the Polymeter it may be easily ascertained; as, for example, in a room 5 meters long, 4 meters wide, 3 meters high, there would be 60 cubic meters. If by the Polymeter the humidity is 70 per cent. and the temperature 60 degrees, on the right-hand scale opposite to 60 degrees we find 13 millimeters, the maximum force of vapor. According to formula, the maximum force of vapor can be transposed into the same number of grammes per cubic meter. Therefore, 13 grammes $\times .70 = 9.10$ grammes per cubic meter. By multiplying the contents of the room, 60 cubic meters, by 9.10 grammes, the result is 546 grammes of water. If at the same temperature, and the Polymeter should indicate 100 per cent. or full saturation, there would have been 780 grammes of water in the air of the room.

NOTE.—In these examples the French system of measure has been used because it is now the scientific standard of this country. But if it is desirable to have them in the old English form of inches and grains, the work of Professor Hazen, "Meteorological Tables," is recommended, price by mail $1.00 postpaid.

RULES FOR ADJUSTING THE POLYMETER.

1. If the index-hand of the Polymeter points either too high or too low in all positions over the entire scale, it is a sign that it is correctly adjusted but the hand incorrectly set. By means of a small screw-driver a set-screw on top of the instrument can be turned to raise or lower the hand on the dial of the instrument until proper adjustment is obtained.

2. If the hand should point correctly, at say 60, 70, or 100, but should be wrong at 30 or 40, it would indicate that the

instrument is not propertly adjusted for all parts of the scale. To remedy this, turn the instrument upside down, face outward, and a nut will protrude on the right as you now hold it, which may be turned with a watch-key until the hand points to the correct position on the scale.

3. A successful examination of the correctness of the Polymeter can be made, although no instruments for comparison are at hand, as follows:

(a) Put the Polymeter in a damp place, such as the kitchen or cellar, for a few days, and then moisten the full length of the hair with pure water. If by doing so you drive the hand to about 95 per cent., then it is set correctly. It is, of course, necessary to see that the hair hangs straight and does not stick to the walls or sides of the instrument, as it would naturally interfere with the indications of the hand.

(b) Another test for the correctness of the adjustment is by means of the dew-point and the vapor pressure. If the instrument is hung up in the free air, in the shade, as far away as possible from evaporating objects, particularly from the moist ground, and on a day when the weather is constant or unchangeable, we find in the hours from 9 a. m. to 3 p. m. that the relative humidity will change with the temperature, but the dew-point or vapor pressure will remain nearly the same.

(c) If the Polymeter shows this, it is likely well regulated. Still it is not absolutely sure that it is so, because the dew-point may actually change, and, besides this, the thermometric part may be ahead of the hygrometric one, or *vice versa*, for several minutes by sudden changes of temperature.

4. For those possessing a dry and wet bulb hygrometer, the examination is, naturally, a great deal simpler. The comparison, however, should only be made after having placed the two instruments in the moistest possible place, or after it has been ascertained that both of them are set under exactly the same conditions in respect to ventilation.

5. The Polymeter may differ from the Psychrometer:

(a) If the two thermometers are not exactly alike in all parts of the scale, or are not evenly sensitive, or indicate wrongly.

(b) If the muslin cover is too thick and does not evenly cover every part, or is torn, or has lost its hygroscopic sensitiveness by age or dust, etc., thus neither drawing nor discharging the water quickly enough.

(c) If non-distilled water is used.

(d) If the moist thermometer is not brought down to its lowest possible point by the quickest change of air, or the figure on the indicator is not taken at the very moment when the hand reaches that point.

6. It is important to mention a peculiarity of the hair which, if not properly attended to, might possibly cause an occasional error. The hair, if left hanging in dry air for several weeks in succession without being moistened, has the peculiarity of becoming about the one or two thousandth part of its length longer, and, if suddenly moistened, a shrinkage in the same proportion will take place, when it will require about six hours for the hair to attain its original length again.

7. The simplest and easiest way to remedy, or rather prevent, any irregularity is to immerse the instrument in water, or moisten the full length of the suspended hair several times with pure water by means of a camel's hair brush, or by hanging the Polymeter in a damp kitchen or in the free air on a foggy day. This moistening of the hair should be done once or twice every month.

If the moistening is properly attended to, the Polymeter is more reliable than even the best Psychrometer, which easily gets out of order.

8. The friction of the hand of the Polymeter is almost nominal, as the angle-box is made of silicon bronze, and the axle of nickel copper. If spiders, etc., should get inside of the instrument, they should, of course, be removed at once. Dirt, dust, etc., on the hair may influence the sensitiveness, but should not affect the accuracy of the hand indicating the humidity.

HUMIDITY AND WEATHER FORECASTS.

Foreknowledge of the changes of the weather is of great importance to us all, and is especially valuable to seamen leaving or entering port, to merchants in shipping goods, to gardeners and farmers on account of planting and harvesting their crops, to builders in successfully attending to their work and ordering material, and to physicians as to the welfare of their patients.

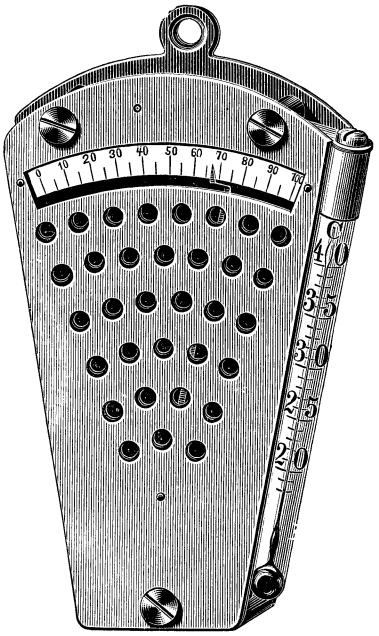
Heretofore the indications of the weather were obtained from expensive barometers, wind-gauges, and thermometers. Now the inexpensive Polymeter gives extremely reliable indications of the coming changes of the weather.

To obtain correct weather readings by the Polymeter it is necessary that the instrument be placed in the open air and shade, where it will not be influenced by the direct heat of the sun. For the maintenance of a healthy atmosphere in the house, it is desirable to have a Polymeter in each room, so as to know the temperature and percentage of moisture of the rooms.

If the Polymeter in the house should indicate 75 per cent. or more humidity, and a fall of temperature occur, the moisture in the air would deposit and dampen our clothing, bedding, furniture, walls, etc. This deposit of moisture can easily be pre-

vented by lighting a small fire and thus raising the temperature inside the house.

Should the Polymeter in the room indicate 40 per cent. or less humidity, then such air would prove very uncomfortable, the throat become parched, the skin dry, the furniture shrink and crack, and plants would wither and die. Evaporation of water under these conditions is absolutely necessary to render the atmosphere suitable for health or the growth of plants.



(Pattern No. 23*d*.)

CLINICAL HYGROMETER.

The Clinical Hygrometer is especially constructed for hygienic purposes. The instrument can be worn, without any discomfort, on the immediate surface of the body. By means of a small index, the percentage of moisture or the artificial climate of the human body can be tested and measured.

The instrument is in use at the Hygienic Institute in Berlin, under the direction of Prof. Dr. Koch. Also used by many other medical authorities.

WEATHER FORECASTS FROM POLYMETER OBSERVATIONS.

General Instructions. On account of the changeable character of the weather the observer must note, from time to time, the changes in the indications of the Polymeter, as well as the existing conditions of the weather, at least such as the current temperature of the air, direction of wind and state of the weather. A continuous record should be kept, made at the same hours each day, as may be most convenient, and these observations *must be recorded at the time they are made* in a suitable blank book provided for the purpose. A frequent and careful study of these records with special reference as to what prevailing weather conditions followed certain Polymeter indications will be of great value in making more accurate forecasts.

Observations of clouds and wind should be taken, as to their character and the direction from whence they are coming. The *cirrus* cloud resembles a lock of hairs, or a feather consisting of streaks, wisps, fibres, and are popularly known as mare's tails. They are the highest of the clouds; are supposed to be frozen particles of vapor, and are the cause of solar and lunar halos and parhelia or mock suns, etc. The *cumulus* cloud is a dense convex heap with rounded forms definitely terminated above, indicating saturation in the upper clear sky. The *stratus* cloud is an extended, continuous level sheet of low elevation. This form of cloud sometimes rests upon the earth, when it is called *fog*. The *cumulo-stratus* or anvil-shaped cloud is the forerunner of heavy gales of wind. The *scud* cloud is a light, fleecy, quickly-moving cloud. If it is coming from the ocean or south, expect rain; if from the land or north, clear weather can safely be predicted. The *nimbus* cloud is a dense cloud spreading out into a crown, generally preceded by stratus clouds, and passing beneath into an extended horizontal cloud from which rain or snow is falling. If through the falling raindrops the rays of the rising or setting sun should pass, they will make in the opposite horizon those beautiful rainbows as a pledge that the earth shall not be destroyed by water again.

POLYMETER DEW-POINT FORECAST RULES.

1.—A rising dew-point indicates warmer weather.

2.—A falling dew-point indicates cooler weather.

3.—A rapidly rising dew-point indicates a distant and approaching thunderstorm, particularly in spring and summer.

4.—A high dew-point, or humidity of 70 degrees or more, with

a muggy atmosphere, indicates an approaching thunderstorm.

5.—A falling dew-point, with temperature of same at 32 degrees or lower, indicates frost, especially when the sky is clear and there is little or no wind.

6.—A rapidly fluctuating dew-point indicates wind.

7.—A higher dew-point at 6 p. m. during the summer than the mean temperature during the middle of the day, indicates an approaching thunderstorm.

8.—Slight changes in dew-point temperature indicate fair weather with certainty, even under unfavorable atmospheric conditions.

9.—The more constant the limits of variation of the temperature and dew-point the more constant the coming weather.

10.—The greater the changes between the temperature and the dew-point the greater the probabilities for rainy or stormy weather.

11.—After sunset, especially during a clear sky, a temporary rising of the dew-point may be perceived in consequence of a rapid and unequal cooling of the lower strata of the air. In this case it is not certain if it is a general or a local increase in the quantity of vapor, but if an observation is taken from the Polymeter about two hours after sunset a correct forecast can be made.

12.—Owing to the changeable character of the weather the observer must note from time to time the changes in the indications of the Polymeter, and he must not expect to forecast the coming weather by a casual look at the instrument. If, for instance, at 2 p. m. the index of the Polymeter points to 4 degrees on the upper scale of the dew-point figures, this would indicate a vapor-laden atmosphere; but if at 4 p. m. a rise to 5 degrees is noted, and again at 6 p. m. a further rise to 6 degrees, fine weather may be safely predicted for the coming day.

TESTIMONIALS.

Many unsolicited testimonials have been given me during the past few years in respect to the Polymeter, and in no case has it failed to perform its functions when properly handled and adjusted. Nothing but words of praise have been given it, and the following *bona fide* testimonials have been selected from those recently received, as giving the opinions of well-known scientists and meteorological observers, all of whom have had practical experience with this ingenious instrument and are fully qualified to judge as to its merits.

(Tested by U. S. Weather Bureau.)

Subject: "Polymeter." 8544 Mis. '94. M. W. H.

U. S. Department of Agriculture, Weather Bureau,
Washington, D. C., December 27, 1894.

Mr. Julien P. Friez, Maker of Meteorological Instruments, 107 East German St., Baltimore, Md.

Sir: In reply to your letter of December 22nd relating to the character of the "Polymeters" furnished this bureau, I would say that we find them a very compact, well made and substantial form of the Hair Hygrometer, and quite as reliable in action as such forms of Hygrometer could be expected to be.

Very respectfully,
MARK W. HARRINGTON, Chief of Bureau.

("An excellent instrument.")

Paducah, Ky., December 29th, 1894.

Mr. Julien P. Friez, Baltimore, Md.

Dear Sir: I beg to say that I consider the Lambrecht Polymeter an excellent instrument. The more I study it the more I find out about its fine results, and I can, therefore, highly recommend it in preference to other hygrometers.

I think no place where the proper degree of humidity of the atmosphere is essential should be without it.

Yours truly,
WM. BORNEMANN.

("A valuable instrument for practical use.")

U. S. Department of Agriculture, Weather Bureau,
Office of the Observer, New York City, Feby. 11th, 1895.

Mr. Julien P. Friez, Baltimore, Md.

Dear Sir: I have no objection to stating that for practical use I find the Polymeter a very valuable instrument for obtaining humidity.

Very respectfully,
E. B. DUNN.

("Makes life more interesting.")

THE JACKSON SANITORIUM.

Managing Physicians, James H. Jackson, M. D., Kate J. Jackson, M. D., Walter E. Gregory, M. D.
Secretary and General Manager: J. Arthur Jackson.

Dansville, New York, Jan. 3d, 1895.

Mr. Julien P. Friez, 107 E. German St., Baltimore, Md.

Dear Sir: I am so well satisfied with the instruments you sent me last year, that I want to enlarge a little the scope of my observations and the nicety of them, so I shall want of you a self-registering thermometer.

The Polymeter you sent me last year has done the very best of work. I find it accurate and the calculations are easy, and it is very interesting to watch. My guests are much pleased with it, as it enables them very readily to determine the condition of the atmosphere, so far as humidity is concerned, and makes their daily life a little more interesting. I do not see how this instrument could be improved upon, and it has never given me any trouble. Sincerely yours,

(Dictated.) JAMES H. JACKSON.

("A most perfect little instrument.")

U. S. Department of Agriculture, Weather Bureau. Office of the State Weather Service,

Sacramento, California, December 25th, 1895.

Mr. Julien P. Friez, Baltimore, Md.

Dear Sir: I consider the Polymeter a most perfect little instrument for obtaining the temperature, dew-point and humidity of the atmosphere, and, to my knowledge and way of thinking, is a good instrument for a voluntary observer of ordinary intelligence. I think if a maximum and minimum thermometer of the Sixe's pattern were attached to them, then it would be a complete meteorological observatory in itself for all practical purposes for the farmer, or for any other branch of agricultural industries. In all probability the instrument would not act so readily in its dew-point and humidity readings in the desert regions of this state, except by occasionally completely saturating the hair arrangement,* otherwise I think it a valuable adjunct to the rural population. I have never heard anything but praise for the instrument from those who have purchased them, in this section of California. Very respectfully,

JAMES A. BARWICK,
Director, California Weather Service.

("More sensitive than wet-bulb Hygrometers.")

R. I. College of Agr. and Mechanic Arts.

[L. S.] State of Rhode Island.

John H. Washburn, Ph. D., President.

Kingston, R. I., Jan. 3d, 1895.

Mr. Julien P. Friez,

Dear Sir: It gives me pleasure to say that the Polymeter purchased of you in October last has proved satisfactory in every way, being more sensitive to changes in moisture of the atmosphere than the ordinary wet-bulb hygrometer. I can recommend it, from what I have seen of it, as a very valuable instrument for the purposes for which it was intended.

Yours very truly,
NATHANIEL HELME, Meteorologist.

* This is required by instructions, under such extreme conditions of dryness.—J. P. F.

("Gives perfect satisfaction as a Weather Forecaster.")

W. G. Whitefield, Dealer in Leaf Tobacco.

Paducah, Ky., Dec. 28th, 1894.

Mr. Julien P. Friez, Baltimore, Md.

Dear Sir: I wish to say, in reply to yours of the 24th inst., in regard to the Polymeter I bought of you nearly 2 years ago, that it has given perfect satisfaction as a weather forecaster. I think that those who can afford it should have one in each room, and especially in bedrooms. They certainly would be valuable for churches, schools, factories, in fact all public buildings.

I cannot say too much for the Polymeter.

Your friend, W. G. WHITEFIELD.

("Very useful on the farm.")

Thomas Plater, President; J. B. Hancock, Vice-President; E. W. Cole, Chairman Executive Committee; J. H. Fullton, Cashier; W. T. Tyler, Asst. Cashier. The Capital City Bank, Paid-up Capital $300,000.

Nashville, Tenn., Dec. 27th, 1894.

Julien P. Friez, Esq.

Dear Sir: The Polymeter purchased from you through Mr. J. B. Marbury, Director, Tenn. State Weather Service, has given me entire satisfaction. It is very sensitive to humidity, and I find it very useful on the farm. Yours very truly,

J. H. FULLTON.

("Gives a reliable forecast.")

Robt. Hall, Sonoma, Cal.

Sonoma, California, U. S. A., Dec. 30th, 1894.

Mr. Julien P. Friez, Baltimore.

Dear Sir: Having made a careful daily examination, the past two years, of the correctness of the Polymeter, I can say I prefer it to any other instrument.

With the Polymeter you are able to note the changeable character of the weather *sooner* than indicated by the barometer.

Most certainly it will give a reliable forecast of the weather for the coming day. Yours meteorologically,

ROBT. HALL.

A large stock of these Polymeters is constantly carried on hand, and all orders are filled promptly as received.

For prices of these famous instruments, see Special Price List, copies of which are enclosed with this pamphlet, or will be sent on application.

All communications and orders must be addressed to the SPECIAL AMERICAN AGENT,

JULIEN P. FRIEZ,
107 E. German St., Baltimore, Md., U. S. A.