

CO. 1900 - 1908
1915



DESCRIPTIVE
PRICE LIST

OF
STANDARD

17 204
320

Meteorological Instruments

MADE BY

NEGRETTI & ZAMBRA,

Opticians and Scientific Instrument Makers

To THE METEOROLOGICAL OFFICE; THE ROYAL OBSERVATORY, GREENWICH;
THE ADMIRALTY; THE ROYAL METEOROLOGICAL SOCIETY;
THE OBSERVATORIES, KEW, TORONTO, WASHINGTON, VICTORIA & CAPE OF GOOD HOPE
AND ALL FOREIGN GOVERNMENTS.

38, HOLBORN VIADUCT,

BRANCHES:—45, CORNHILL, and 122, REGENT STREET,

LONDON.

NOTICE.—The greatest possible care being taken in packing Meteorological Instruments and Apparatus, NEGRETTI & ZAMBRA cannot hold themselves responsible for any damage or breakage that may occur in transit.

HONORARY AWARDS

TO

NEGRETTI & ZAMBRA.



LONDON, 1851.—*The only Prize Medal for Meteorological Instruments was awarded to NEGRETTI & ZAMBRA.*



PARIS, 1855.—*“Honourable Mention.”*

(The Kew Committee exhibited among their Apparatus one of our Patent Maximum Thermometers—The Jury awarded an Honourable Mention for this Instrument—NEGRETTI & ZAMBRA not having exhibited at all).

The “Austrian Gold Medal,” for Stereoscopic Photographic Views on Glass.



LONDON, 1862.—*Two Prize Medals:*

I. Meteorological Instruments—the terms of the award being as follows:—“For many important inventions and improvements, together with accuracy and excellence in objects exhibited.”

II. Photographic Transparencies—“For beauty and excellence of, and adaptation of Photography to Book Illustrations.”



SANTIAGO, CHILE, 1875.—*A Prize Medal—For collection of Optical and Physical Instruments.*



PHILADELPHIA, 1876.—*Three Prize Medals:*

I. “For Meteorological Instruments;”

II. “For Thermometers;”

III. “For Microscopes.”



PARIS, 1878.—*The only Gold Medal awarded for Meteorological Instruments in the British Section.*



LONDON, 1883.—*Royal International Fisheries Exhibition:*

2 Gold Medals—“For Barometers and Thermometers;”

1 Silver Medal—“For Deep-Sea Thermometers;”

1 Bronze Medal—“For Current Meters.”



BATAVIA, 1883.—*A Gold Medal—“For Meteorological, Optical and Nautical Instruments.”*

PARIS, 1900.—*Two Gold Medals.*

STANDARD BAROMETERS.

The Standard Barometer, constructed on the "Fortin" principle, is the pattern that has been universally adopted as the most reliable and accurate instrument.

The level of the mercury being adjusted before each observation to a fixed zero point, the accuracy of the readings is not affected by any leakage or oxidization of the mercury.

The tubes are of varying diameters, according to the prices of the Barometers, and are filled with pure mercury, which is very carefully boiled in the tube in order to expel all moisture and air.

The barometrical scale is graduated in English inches to $\cdot 05$ -inch, and reading by means of the vernier to $\cdot 002$ -inch; or in millimetres, reading by vernier, to $\cdot 05$ -millimetre. The scale usually extends from 32 to 24 inches, or 830 to 640 millimetres, but can be constructed and graduated much lower if required, slightly increasing the price.

The reservoir or cistern is of glass, closed at the bottom by a leather bag protected by a metal sheath, into the bottom of which is fitted a thumb-screw for the requisite adjustments.

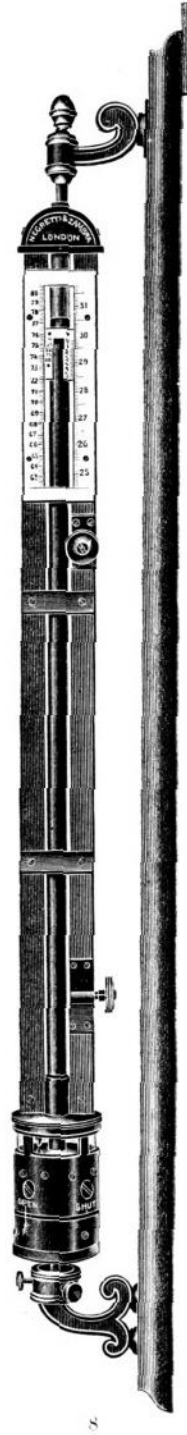
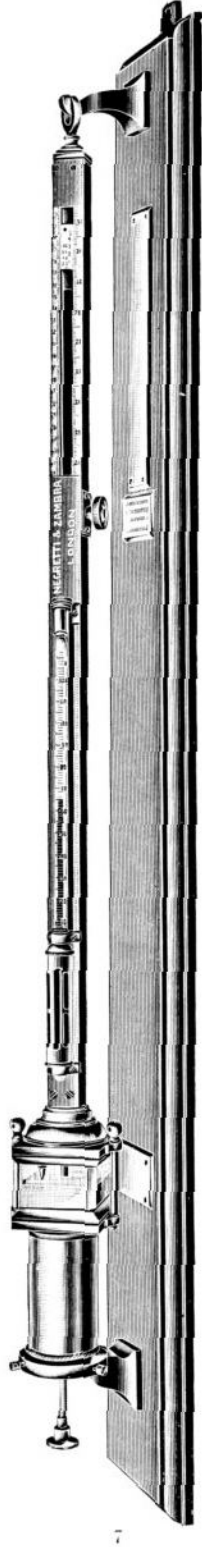
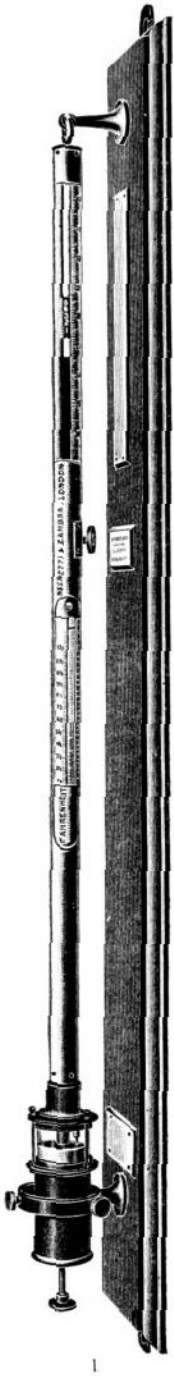
A delicate Thermometer graduated on the stem to 1° Fahrenheit or $\cdot 5^{\circ}$ Centigrade is attached to the brass frame, and the instrument complete is mounted on a polished mahogany board with opal glass reflectors at the back of the scale and cistern.

Directions for Fixing the Barometer.—In selecting a position for a Barometer, care should be taken to place it so that the sun cannot shine on it, and that it is not affected by direct heat from a fire. The cistern should be from two to three feet above the ground, which will give a height for observing convenient to most persons. Having determined upon the position in which to place the instrument, fix the mahogany board in a vertical position, and ascertain if the Barometer is perfectly free from air as follows :—

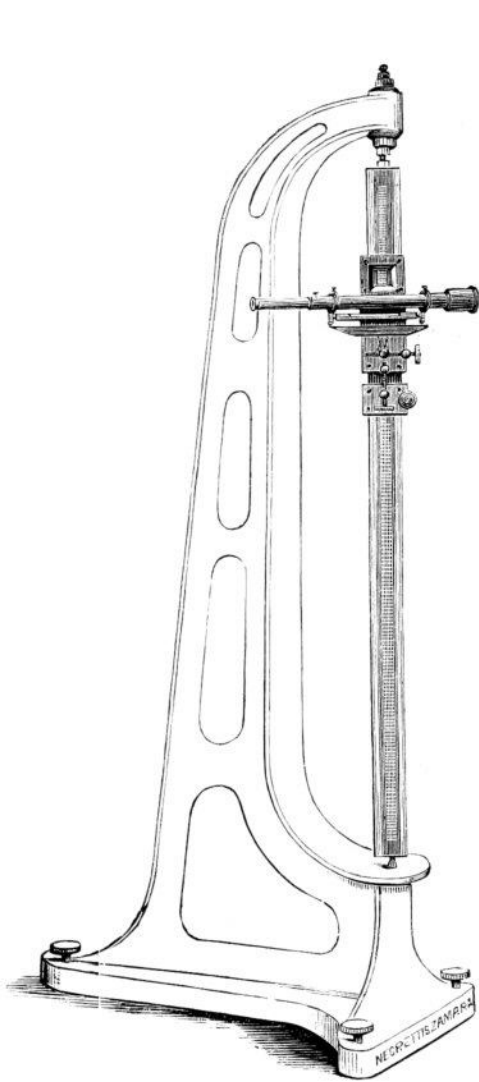
Lower the adjusting screw at the bottom of the cistern several turns, so that the mercury in the tube when held upright may fall two or three inches from the top; then slightly incline the instrument from the vertical position and if the mercury in striking the top elicit a sharp tap, the instrument is perfect. If the tap be dull or not heard at all, there is air above the mercury; this must be driven into the cistern by partially re-screwing and then inverting the instrument, and gently tapping it on the floor.

The Barometer being in perfect condition, suspend it on the brass bracket, and allowing it to find its position, clamp the cistern by means of the three lower screws.

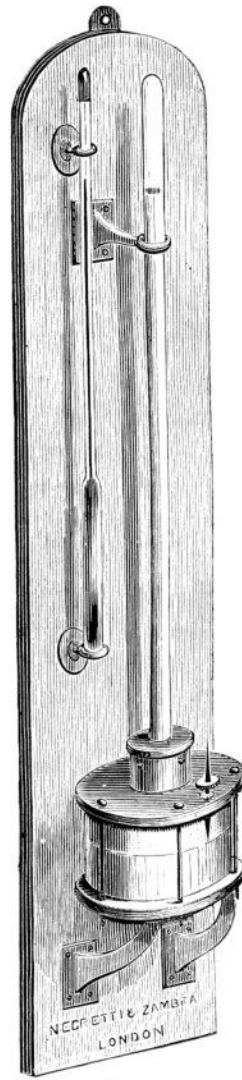
Directions for Taking an Observation.—Having taken the temperature by the attached Thermometer, the mercury in the cistern is raised or lowered by means of the adjusting screw until the fiducial point and its reflected image in the mercury are just in contact; the vernier is then moved by means of the upper milled head until its lower edge just excludes the light from the top of the mercurial column; the reading is then taken from the scale and the vernier.



	£	s.	d.
1. Standard "Fortin" Barometer , as described above, internal diameter of the tube $\frac{1}{4}$ -inch graduated either English or Metric scale	8	8	0
2. Ditto, ditto, graduated both English and Metric scales ...	9	9	0
3. Ditto, ditto, with tube $\frac{1}{4}$ 5-inch internal diameter	10	10	0
4. Ditto, ditto, ditto, 5-inch	12	12	0
5. <i>Ditto, ditto, ditto</i> , 6-inch	15	15	0
6. Standard Barometer , graduated English and Metric scales, with tube $\frac{1}{4}$ 6-inch internal diameter, mounted in a square tubular frame, giving greater strength and an imposing appearance	21	0	0
7. Standard Barometer , with square frame and square cistern, all parts being very finely polished and lacquered; the Thermometer is extra large with a bold bore, and the instrument complete of a very handsome appearance, <i>suitable equally for an Observatory or for a Public</i> <i>Institution</i>	25	0	0
8. Standard Barometer , <i>originally designed by Newman</i> , and since constructed solely by NEGRETTI & ZAMBRA. The pillar frame is entirely of brass, and the tube has an internal diameter of $\frac{1}{4}$ 6-inch . The cistern is made of iron instead of leather, and is constructed on a special principle in order to make the instrument portable when <i>desired</i> ; the usual cylinder of glass allows the index to be seen. When the Barometer has been set up and put into action, the fiducial point is brought into contact with the surface of the mercury by means of the rack and pinion shewn at the lower end of the frame—and this rack moves at the same time through a corresponding distance, the <i>entire graduated scale</i> . The <i>height of the column</i> is observed by means of the vernier actuated by the upper rack in the usual manner. A Standard Thermometer is mounted on the brass frame. This instrument, which is of the highest accuracy and best workmanship throughout, is mounted on a polished oak board by heavy brass brackets, and is supplied with a certificate of corrections of the National Physical Laboratory	30	0	0
9. Ditto, ditto, identical with the above, but having the scales and vernier graduated on platinum instead of on silvered metal (the price depending upon the market value of platinum)	35	0	0



13

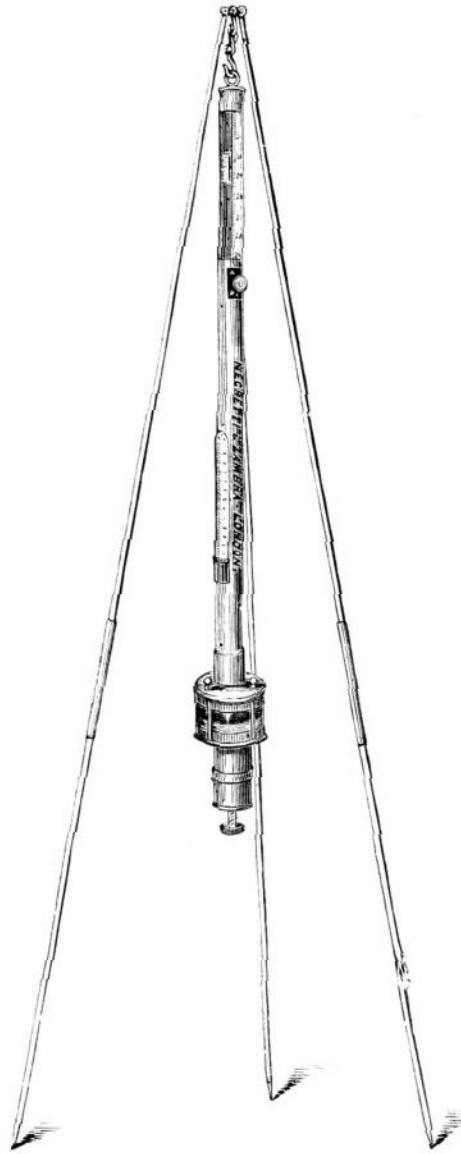


10

- | | <i>£</i> | <i>s.</i> | <i>d.</i> |
|--|----------|-----------|-----------|
| 10. Standard Observatory Barometer , as used at Kew and Greenwich, with specially large tube and cistern. No graduated scale is required, the readings being taken by a Cathetometer for extreme precision | 35 | 0 | 0 |
| 12. Cathetometer for use with the Barometer specified above | 40 | 0 | 0 |
| 13. Ditto, ditto, superior pattern, mounted on a heavy cast-iron stand, and reading to '0001-inch | 60 | 0 | 0 |



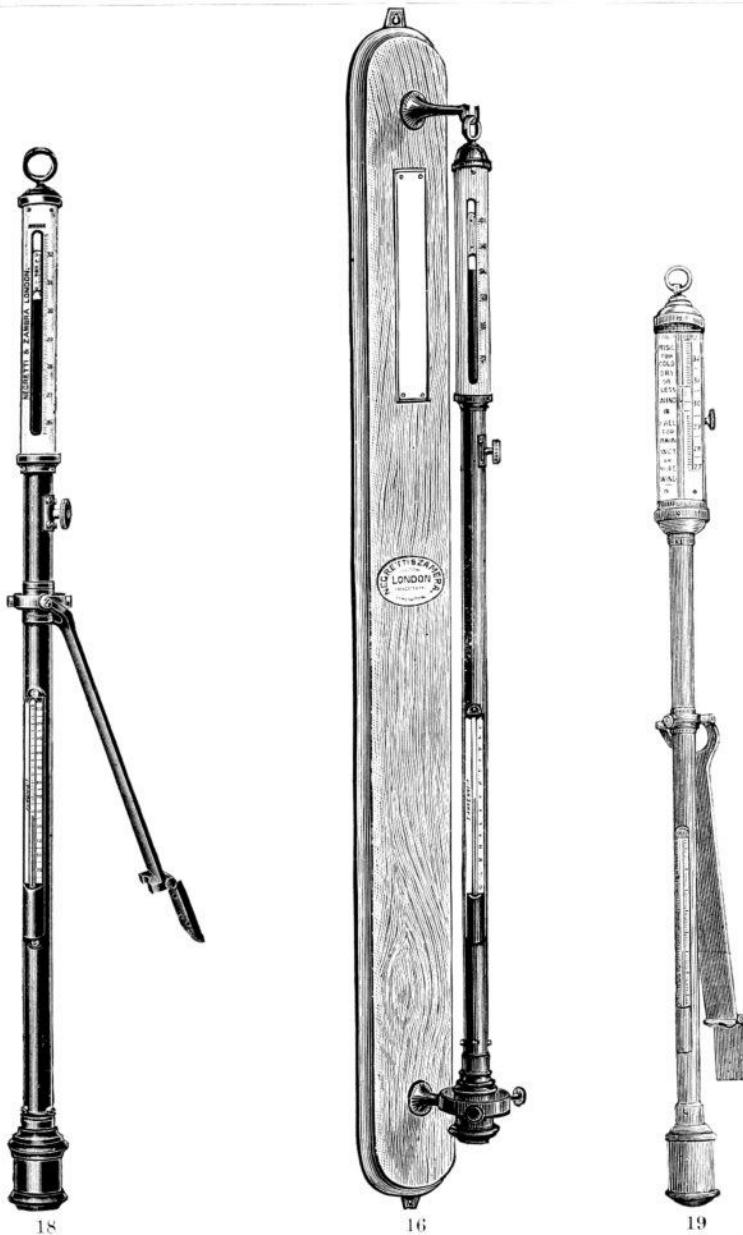
14



15

£ s. d.

14. **Station Barometer**, as supplied to the Meteorological Office, in bronzed brass frame, with iron cistern and tube 5-inch internal diameter. The scales and vernier are of opal glass on which the graduations and figures are indelibly fired. Mounted on a polished mahogany board with brass brackets and opal glass reflector 6 6 0



15. **Standard Mountain Barometer** for determining altitudes correctly from barometrical pressure, constructed on the "Fortin" principle. The scale is graduated from 32 to 14 inches and reads to $\cdot 002$ -inch; or from 810 to 370 millimetres, reading to $\cdot 05$ millimetres. The vernier is so constructed that it can be used in any part of the scale without the need of a rackwork adjustment. The internal diameter of the tube is of a necessity small, in order to avoid unnecessary weight. The Barometer with its brass tubular stand fits into a convenient portable leather case

£ s. d.

10 10 0

16. **Standard Barometer, Kew pattern.** The principle upon which this pattern is constructed does away entirely with the necessity of adjusting the level of the mercury before each observation, thus avoiding a certain loss of time. A correction having to be made for "capacity," *i.e.* the difference of level of the mercury in the cistern at any two points, the graduated scale, instead of being in standard inches as in the "Fortin," is contracted. This contraction has been very minutely calculated from the internal diameter of the mercury tube as compared with the diameter of the iron cistern. The instrument is fitted with a Thermometer on a polished mahogany board with opal glass reflectors 5 5 0
- NOTE.**—The iron cistern must **not** be unscrewed, otherwise the readings will no longer be accurate.
17. **Standard Barometer, "Ronan's" pattern.** This pattern was designed in order to have an instrument with standard inches and a fixed zero point, which at the same time might be made portable without any trouble. The principle on which it is constructed is that of a flat cistern of very large diameter, allowing space for the mercury to spread horizontally when falling, without affecting the measurement from the surface to the graduations. The method of making the instrument portable is similar to that of the "Fortin" pattern ... 7 7 0
18. **Marine Barometer.** The form of the Standard pattern is identical with No. 16 except that it is mounted on a brass arm with gymbal ring in place of the mahogany board, so that it may remain always in a vertical position. Lest the movement of the ship should cause the mercury column to oscillate, the bore of the tube is contracted near the cistern, thus making the action of the mercury slower and steadier. Constructed at the lower end of the tube is an improved arrangement which prevents any air from rising from the cistern into the vacuum. The Barometer is packed in a strong pine case with rope handle and lock and key 4 10 0
19. **Marine Barometer, "Admiral Fitzroy's" pattern,** constructed specially for use on gunboats, etc. The principle is the same as the above, but the scales are very legible, being permanently painted on porcelain; the frame is entirely of brass, hence no rust, and the tube is fitted very carefully into the frame with vulcanized india-rubber to check vibration from concussion in firing. Fitted in pine case as above 5 10 0

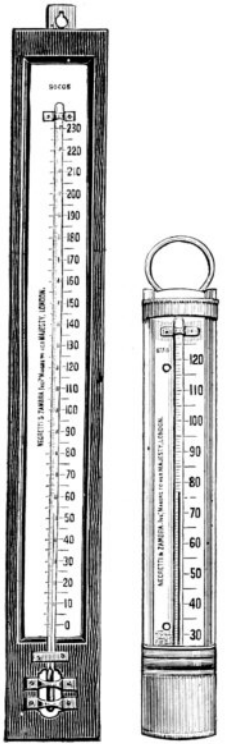
	£	s.	d.
20. Standard Barometer, "Fortin" principle, with .35-inch tube in bronzed frame on a mahogany board	6	6	0
21. Standard Syphon Barometer , principle of " Gay Lussac ," graduated and figured on the glass tube, with sliding verniers, Thermometer graduated on the stem, mounted on polished mahogany board	5	5	0
22. Spare Tubes for any of the foregoing Barometers, filled with mercury carefully boiled, and hermetically sealed—			
For Standard "Fortin" Barometer .35-inch	2	2	0
Ditto, ditto, .4-inch	2	10	0
Ditto, ditto, .45-inch	3	0	0
Ditto, ditto, .5-inch	3	15	0
Ditto, ditto, .6-inch	5	5	0
For Standard "Ronan" Barometer	1	15	0
Ditto, Mountain ditto	1	0	0
Ditto, Kew pattern ditto	1	15	0
Ditto, Marine ditto	1	5	0
Ditto, "Fitzroy" ditto	1	10	0
23. Oak Cases for Standard Barometers, rendering them secure from dust, injury, etc., polished light, dark, or ebonized, with hinged door and substantial lock and key, with plate glass in front only	3	10	0
24. Ditto, ditto, ditto, and both sides	4	15	0
25. Ditto, ditto, ditto, ditto, and at back of case for the better reflection of light	6	6	0
Certificates are issued by the Authorities of the National Physical Laboratory for any of the foregoing Barometers.			
26. Standard Barometers, with attached Thermometers... ..	0	10	6
27. Mountain ditto, ditto, ditto	0	12	6
28. Marine and Kew ditto, ditto, ditto	0	15	0

IMPORTANT NOTE.—NEGRETTI & ZAMBRA take the greatest possible care in packing Barometers, etc., but cannot hold themselves responsible in any way for any breakage that may occur in transit. They strongly advise, in the case of these delicate instruments, that the customer should take it by rail in his own charge. If, however, this course is impracticable, the most satisfactory method is to have the Barometer placed in charge of the guard of a through train—for the customer to meet the train at his station, and by taking the case from the guard he ensures that it does not meet with the same treatment as the rest of the luggage. Barometers should always be carried with the cistern end uppermost, and the cases and parcels are always made up with the handle in such a position as to ensure this.

When ordered **for export**, the same care should be taken by having the case containing the instrument specially stowed in some secure spot on board. If the customer then takes the case from this spot on the arrival of the ship at his port, all chance of breakage is eliminated.

Standard Barometer Tubes of large bore are fitted into metal protecting sheaths for export, and are supported at different points with cotton packings; these must be removed, and the tubes screwed into their respective brass frames when placing in position.

STANDARD THERMOMETERS.



30

31

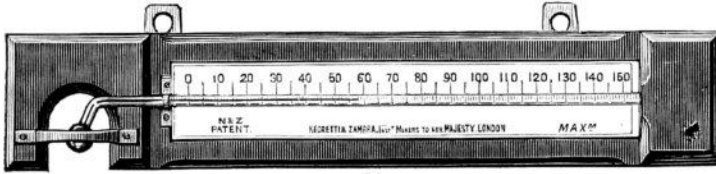
NEGRETTI & ZAMBRA'S Standard Thermometers are made from very carefully selected tubes, the bores of which have been accurately calibrated, and which, when first made, are stored for several years before being graduated, in order to ensure that the glass of the bulb has settled to its final condition. Otherwise, it will be found that after some time the temperatures indicated will be too high.

£ s. d.

- | | |
|--|---------------|
| <p>29. Independent Standard Thermometer, enamelled tube, engine divided into $\cdot 5$ degrees, either Fahrenheit or Centigrade, on its own stem, mounted on silvered metal scale divided and figured with the corresponding Centigrade or Fahrenheit scale, and fitted into a Morocco leather case. Verified at the National Physical Laboratory and supplied with a table of corrections at every 10 degrees from 32° to 212° Fahrenheit</p> | <p>5 5 0</p> |
| <p>30. Comparative Standard Thermometer, divided as No. 29, mounted on opal glass scale in mahogany frame, with Kew certificate</p> | <p>2 2 0</p> |
| <p>31. Reference Thermometer, graduated on the stem into single degrees, mounted on porcelain scale on which the figures are painted and indelibly fired, in japanned copper case, with Kew certificate; as supplied by NEGRETTI AND ZAMBRA to the Meteorological Office, for use in H.M. Navy, etc., etc.</p> | <p>0 15 0</p> |
| <p>This Thermometer is universally adopted by Meteorological observers as the standard for indicating air, shade, sea-surface, and other temperatures.</p> | |
| <p>32. A Set of Six Thermometers, as described above, with Kew certificates, fitted into a strong stained pine box with two japanned copper cases. As supplied to the Meteorological Office... ..</p> | <p>4 4 0</p> |
| <p>33. Standard Chemical Thermometers made to order to any required length or range of scale. Graduated on stem to either $\cdot 5$, $\cdot 2$ or $\cdot 1$ degree Fahrenheit or Centigrade...from</p> | <p>0 15 0</p> |

NEGRETTI & ZAMBRA will be pleased to give quotations for **Standard Low Range** Thermometers, of which they make a speciality, on application.

NEGRETTI & ZAMBRA, 38, HOLBORN VIADUCT,
SELF-REGISTERING THERMOMETERS.



34

£ s. d.

34. **Negretti & Zambra's Patent Self-Registering Standard**

Maximum Thermometer consists of a tube of mercury fitted on an opal glass scale, as shown above. The Thermometer tube above the mercury is entirely free from air, and in the bend above the bulb, is inserted and fixed with the blow-pipe a small piece of solid glass enamel, which acts as a valve, allowing mercury to pass on one side of it when heat is applied but not allowing it to return when the Thermometer cools. When the mercury has been once made to pass the valve (which nothing but heat can effect), and has risen in the tube, the upper end of the column registers the maximum temperature.

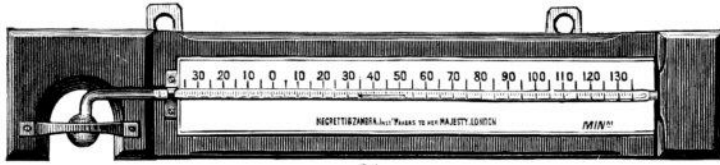
Directions for using Negretti & Zambra's Patent Maximum Thermometer.—Suspend the Thermometer in such manner that the instrument hangs horizontally *in the shade*, with the air passing freely to it on all sides; then, on an increase of heat, the mercury will rise in the tube as in an ordinary Thermometer, and continue doing so as long as the heat increases.

On a decrease of heat, the contraction of mercury will take place *below the bend* in the tube, leaving the whole column of mercury in the tube, registering the highest temperature, and showing such until the instrument is disturbed.

To prepare the instrument for future observations, it is only necessary to swing the Thermometer bulb downwards, with a gentle pendulous motion; the mercury will then descend in the tube and indicate the present temperature. This instrument is the only Maximum Thermometer that can be recommended as it cannot be put out of adjustment. All others are liable to become defective in transit.

	Mounted with enamelled tube and opal glass scale in mahogany frame	...	...	...	...	...	1	1	0
35.	Ditto, ditto, graduated specially for low temperatures to —40° Fahrenheit	...	...	...	...	...	1	5	0

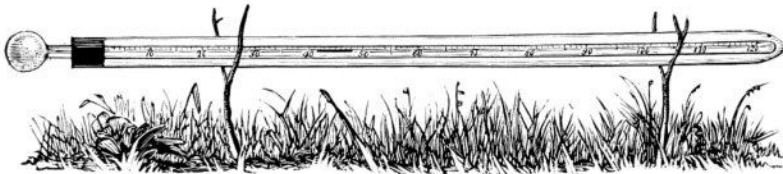
NOTE.—All NEGRETTI & ZAMBRA'S Standard Thermometers, unless otherwise ordered or specified, are graduated in 1° Fahrenheit or .5° Centigrade.



36

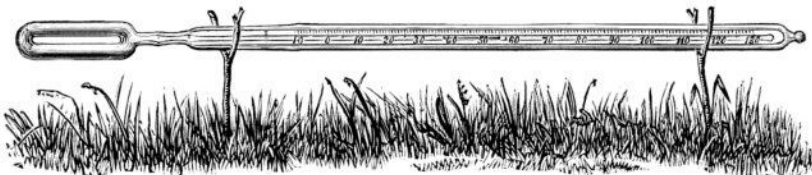
£ s. d.

36. **Negretti & Zambra's Standard Minimum Thermometer** consists of a glass tube and bulb filled with perfectly pure alcohol, in which floats a black index. A slight elevation of the Thermometer, bulb uppermost, will cause the index to fall to the surface of the liquid, where it will remain unless shaken. On a *decrease* of temperature the alcohol recedes, taking with it the index; on an *increase* of temperature, the alcohol alone ascends in the tube, leaving the end of the index *farthest* from the bulb indicating the minimum temperature 1 1 0
37. Ditto, ditto, graduated for low temperatures—80° Fahrenheit 1 5 0



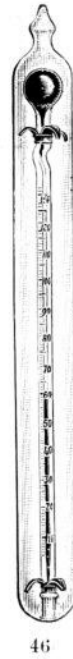
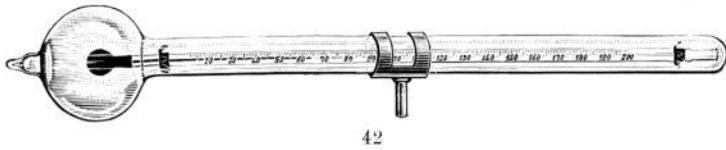
38

38. **Terrestrial Radiation Thermometer.** The degrees and figures are etched on the glass stem, and protected by a hermetically sealed glass sheath. It should be placed with its bulb fully exposed to the sky resting on grass, with its stem supported by little forks of wood as shewn 1 1 0



39

39. Ditto, ditto, with a special bulb constructed in the shape of a link to obtain extreme sensitiveness by the large surface exposed to the air 1 5 0
40. Ditto, ditto, with a hollow T shaped cylindrical bulb and in which the spirit forms a thin sheet, no portion of which is more than .1 inch in thickness. This is the most sensitive type of spirit Thermometer that can be constructed 1 15 0



£ s. d.

- | | |
|--|---|
| <p>41. Negretti & Zambra's Patent Solar Radiation Thermometer, constructed on the same principle as No. 34 with a blackened bulb in order to obtain uniform absorption of the solar rays. The figures and graduations are permanently etched on the glass stem, and are protected by a sealed glass sheath from moisture, etc.</p> <p>42. Ditto, ditto, enclosed in a glass tube and bulb from which all the air has been exhausted. The purpose of this vacuum is to ensure the Thermometer indicating the temperature of the rays of the sun without being affected by breezes, etc.</p> <p>43. Ditto, ditto, fitted with NEGRETTI & ZAMBRA'S small mercurial gauge in the globe, from which the observer may be assured of the condition of the vacuum—the maintenance of which is very essential, especially where comparative readings have to be taken</p> | <p>1 1 0</p> <p>1 5 0</p> <p>1 16 0</p> |
| <p>Any of the above Thermometers may be mounted with <i>bright</i> instead of blackened bulbs, if desired, at the same prices.</p> | |
| <p>44. A Brass Stand with clip to take above Thermometers ...</p> <p>45. A Wood Stand for above, painted white, 4 feet high ...</p> | <p>0 4 0</p> <p>1 1 0</p> |

£ s. d.

46. **Negretti & Zambra's Patent Self-Registering Maximum Thermometer**, for recording the temperature of mines, boiling springs, etc. Employed largely by members of the Underground Temperature Committee of the British Association.

This Thermometer has its scale divided upon the stem—the reverse of the ordinary Thermometer, the reading commencing from the end of the tube and not from the bulb. The tube is mounted in a stout glass shield, the bulb being uppermost, and all mercury passing the contraction will by gravity fall to the lower end, and be detained and measured.

In use, the instrument is suspended by the ring attached to the top of the case, and as it enters a heated atmosphere the mercury in the bulb expands into the tube, passing the *bend or contraction* near the bulb. Whatever quantity of mercury passes the bend will remain in the tube, and *not recede when the temperature cools*. Should thirty or forty degrees of mercury pass it will of its own weight fall to the end of the tube. Should it *not do so*, hold the Thermometer in an *oblique* position, the *bulb end being lowest*, so that the mercury in the tube may *very gradually* descend until it touches any mercury at the bend. If now the bulb end be raised, the mercury will again descend, carrying with it any small particles that have passed the bend. When the mercury has all been collected at the end of the tube, read off in degrees on the thermometer scale its indication, and that will be the maximum temperature. The Thermometer tube is enclosed in a hermetically sealed glass sheath, and fitted in a cylindrical copper case with rubber, and a ring at the top for suspension

1 10 0

47. **Negretti & Zambra's Patent Maximum Thermometer**, for use on **board ship**.

The Standard type of Thermometer would not register correctly owing to the motion of the ship, and therefore this instrument is constructed on the same principle as described above.

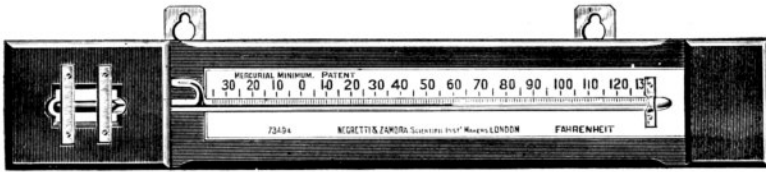
The scale and figures are etched on the glass stem and are protected by a sealed glass sheath let into a mahogany board with mount at the top to hang vertically. This pattern is universally adopted in H.M. Navy ...

0 18 6

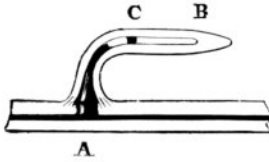
48. **Negretti & Zambra's Minimum Thermometer**, for use on **board ship**.

The principle is the same as NEGRETTI & ZAMBRA'S Standard Minimum, but the divisions, size and manner of mounting are identical with the Maximum described above

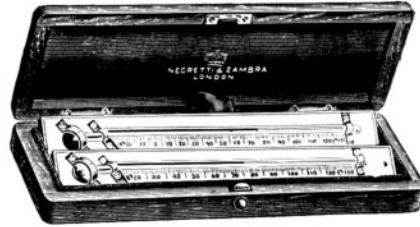
0 18 6



49



49



54

£ s. d.

49. **Negretti & Zambra's Patent Mercurial Minimum Thermometer** is constructed as follows:—

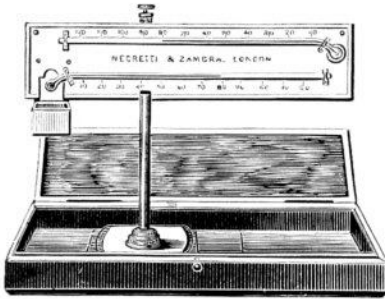
(A) is the Thermometer tube, and (B) a small tube connected to it at right angles about one inch from the bulb. In the tube (B), at the point (c) is inserted a platinum plug which does not entirely fill the bore, as may be seen by elevating either end of the instrument, when the mercury will then flow into the tube (A).

To set for observation. Hold the Thermometer with the bulb downwards until the bulb and tube (B) are quite full of mercury; then raise the bulb end, and the mercury will flow from the tube (B) into the tube (A) until it reaches the plug (c), where it will be checked by the mercury adhering to the platinum plug—the affinity of platinum for mercury being sufficient to arrest the flow of mercury if not allowed to flow too rapidly. Should it not do so, but flow to the end of the tube (A), repeat the operation more carefully.

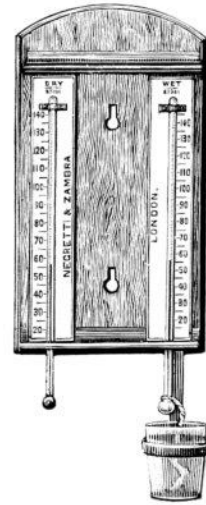
Suspend the Thermometer horizontally, and on a *decrease* of the temperature the mercury will fall in the tube (A) until it attains its minimum temperature; and on an *increase* of temperature the mercury will rise in the tube (B), leaving the indicating column in (A), registering the extreme degree of cold, or minimum temperature. To re-set the instrument for future observation, simply raise the bulb end of the Thermometer until the mercury again comes in contact, and is checked by the platinum plug.

Mounted on opal glass scale in mahogany board ... 2 2 0

STANDARD HYGROMETERS.



51



50

£ s. d.

50. **Standard Hygrometer or Psychrometer** consists of two Thermometers, one marked wet and the other dry, mounted on a wooden bracket. The bulb of the wet Thermometer is covered with thin muslin, round the neck of which is twisted conducting threads of cotton; these pass into a vessel of water placed at such a distance as to allow a length of thread of about three inches; the cup is placed on one side so that the water within may not affect the reading of the dry bulb Thermometer. The temperature of the air and of evaporation are given by the difference of the readings of the two Thermometers

1 15 6
2 2 0

Glaisher's Tables for above, for calculating the dew point, etc.

0 2 6

51. **Hygrometer**, a portable form constructed by NEGRETTI AND ZAMBRA, as a companion instrument to their small Maximum and Minimum Thermometers and pocket Aneroid Barometers

2 2 0

52. Ditto, larger size

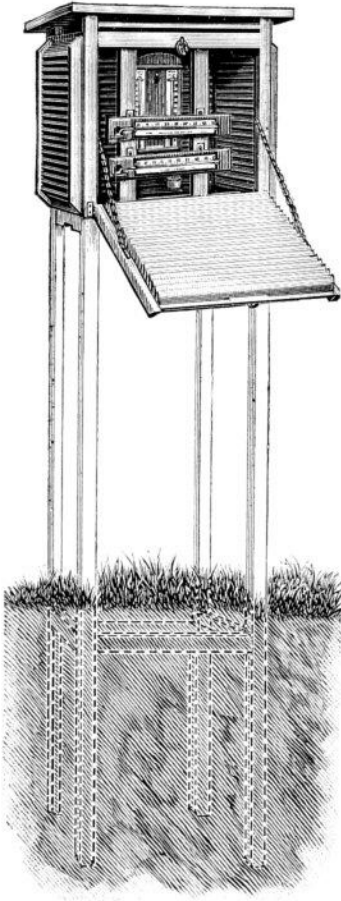
2 10 0

53. NEGRETTI & ZAMBRA'S Portable Patent Standard Maximum and Minimum Thermometers, fitted into a convenient case for travellers; graduations on the glass stem, divisions and figures on silvered metal scales, mounted on boxwood. Size of case, $7\frac{1}{2} \times 2\frac{3}{4} \times 1$ -inch

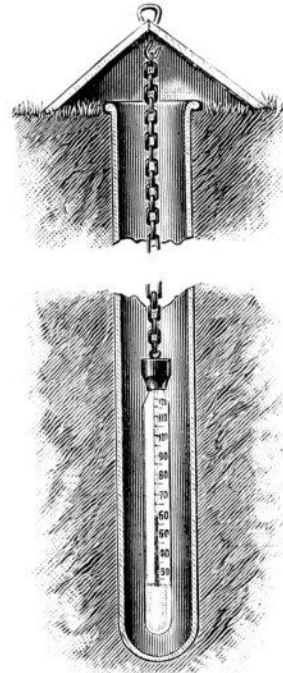
2 2 0

54. Ditto, ditto, larger size, $10\frac{1}{2} \times 3\frac{1}{4} \times 1$ -inch

2 10 0



55



59

£ s. d.

55. **Stevenson's Thermometer Screen**, adopted by the Meteorological Office and the Royal Meteorological Society as the best form for taking Standard Shade Temperatures.

It is constructed of well-seasoned wood, coated with best white paint; the louvres are double, preventing radiant heat, rain, etc., etc., from entering, but allowing a free access to the air.

The supports inside are arranged for fixing the Standard Maximum and Minimum Thermometers and Hygrometers in position. The legs are of such a length that the instruments are 4 feet above the ground, and the front should face the North

3 10 0

56. Ditto, ditto, with short legs, to stand on a wall, or without legs, should the purchaser wish to have them made locally

3 3 0

57. Ditto, ditto, to take the Standard Maximum and Minimum Thermometers only

1 1 0

58. Ditto, ditto, for Hygrometer only

1 1 0

59. **Standard Earth Thermometer**, devised by the late G. J. Symons.

The Thermometer is constructed so that the action may be as slow as possible, the bulb being of stout glass surrounded by a non-conductive wax. The divisions and figures are etched on the glass stem, and the whole enclosed in a hermetically sealed glass sheath

0 17 6

60. The above is firmly secured to the requisite length of brass chain, with a japanned copper top, and supplied with a length of iron barrel to fix into the earth to the desired depth :—

1-foot	...	...	...	...	...	...	...	1	5	0
2-feet	...	...	...	...	...	...	...	1	7	6
4-feet	...	...	...	...	...	...	...	1	10	0
6-feet	...	...	...	...	...	...	...	1	15	0
12-feet	...	...	...	...	...	...	...	2	2	0

61. **Apparatus for Determining Elevations by the Temperature of the Boiling Point of Water.**

The Barometric Thermometer, or Hypsometric apparatus, is intended for use where the Mercurial Barometer cannot be conveniently carried. The instrument is portable, and affords a ready and accurate means of measuring heights by observations of the temperature of boiling water. The apparatus consists of :—

First—A very sensitive Thermometer, the scale ranging from 180° to 212°, having each degree subdivided to .2° Fahrenheit or .1° Centigrade.

Secondly—A metal boiler and stand. From the boiler proceed three double tubes, open at the top, screwed on the top of the boiler; the outer tube has two openings, one at the top, through which the Thermometer is inserted, passing down to within an inch of the water in the boiler, and supported by means of an india-rubber washer; the second opening forming an outlet for the steam. The object of the double tube is to ensure a steady boiling-point, which it would be impossible to obtain in open-air experiments were only a single tube employed. A metallic spirit lamp is supplied, and the whole instrument when packed for travelling is illustrated in Fig. 61A. Each instrument is furnished with a carefully computed set of Tables, from which may be obtained by calculation the elevation corresponding to any observed boiling point between the temperatures of 180° and 212°.

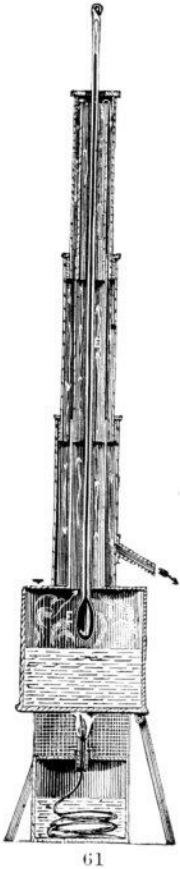
The temperature of the air should be noted by a reliable thermometer at the time of the observation.

Complete in portable solid leather slung case with one High Range Thermometer, and one graduated ordinary range for air temperatures

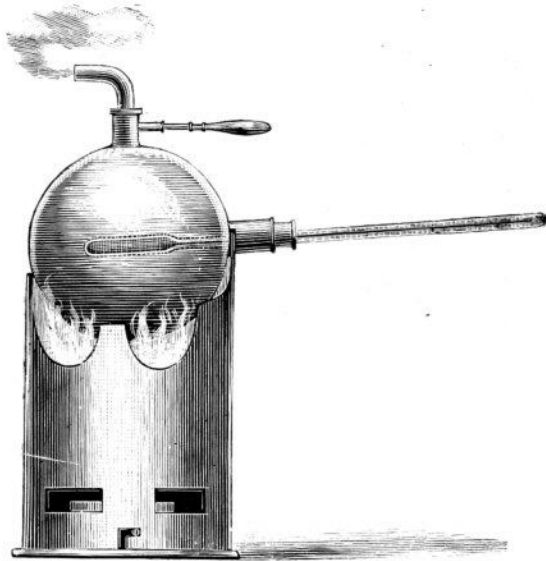
5 5 0

Extra High Range Thermometer

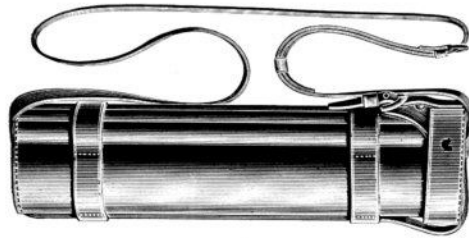
1 10 0



61



62



61A

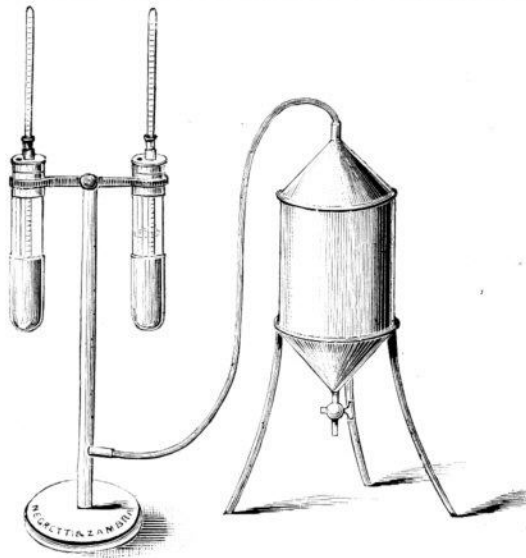
£ s. d.

62. **Negretti & Zambra's Pocket Boiling Point Apparatus**

consists of a small globular metal boiler, mounted upon a metal support. In the base of this stand is a receptacle for holding and burning spirits of wine, by which water in the boiler is rapidly heated up to the boiling point. On the top of the boiler is a tube for the escape of steam during the operation, and on one side is another tube (horizontal) into which is inserted one of NEGRETTI and ZAMBRA'S Patent Maximum Registering Thermometers, finely divided upon its stem, of sufficient range for all possible elevations to be ascertained by the boiling point of water.

Complete in mahogany case with one High Range Thermometer, and one graduated for air temperatures ...

3 0 0



63

£ s. d.

63. **Regnault's Condenser Hygrometer**, for ascertaining by direct observations the Dew-Point, is superior to Daniell's, from its being more certain in its indications. It consists of two highly-polished gilt metal cylinders, into the upper part of which are cemented thin glass tubes: these have brass covers, arranged to receive and support two delicate Standard Thermometers, the bulbs of which descend nearly to the bottom of the silver portion of these chambers. Each chamber has a small internal tube carried down from the brass cap to within a short distance of the bottom, to admit the passage of the air, which is drawn through both chambers by an Aspirator connected to the base of the hollow upright and arms supporting the cylinders.

To use this Hygrometer, ether is poured into one chamber sufficient to cover the bulb of the Thermometer, and then the Thermometers being inserted into both cylinders the instrument is now connected to the Aspirator, and by it the air is drawn through both cylinders down the internal tubes, passing in one chamber in bubbles through the ether, and in the other chamber simply around the Thermometer.

After a short time the passage of the air through the ether will cool it down to the dew-point temperature, and the external portion of the chamber containing the ether will become covered with moisture. The degree shown by the Thermometer in the ether at that instant will be the temperature of the Dew-point; the second Thermometer showing the temperature of the air at the time of observation.

Complete in mahogany case	5	5	0
Japanned Copper Aspirator for above	1	12	6

	£	s.	d.
64. Regnault's Condenser Hygrometer of simpler form, only one cylinder being used. The air in this arrangement is blown through the ether by the mouth. A small Thermometer is attached to the stand to show the temperature of the air. Complete in mahogany case with ether bottle ...	3	10	0
65. Daniell's Hygrometer for direct readings ...	3	3	0
66. Dines' Hygrometer in which very cold water or ice and water can be used instead of ether. Cased in mahogany ...	3	10	0
67. Actinometer Thermometer for ascertaining the Solar Heat. This Thermometer is graduated in the usual way, but as the bulb is placed uppermost the figures are etched on the stem in the reverse manner. It is mounted in vacuo, and the bulb may be either bright or blackened ...	1	5	0
68. Actinometer , principle of <i>Marie Dary</i> . This instrument consists of two thermometers as described above, the one with bright, and the other with blackened bulb, mounted upon a suitable oak stand for out-door exposure ...	3	0	0

Certificates for Thermometers are issued by the authorities of the National Physical Laboratory, as follows :—

Standard Maximum and Minimum Thermometers	0	2	6
Terrestrial Radiation Thermometer ...	0	2	6
Earth ditto ...	0	2	6
Boiling Point ditto ...	0	3	6
Mercurial Minimum ditto ...	0	3	6
Solar Radiation ditto ...	0	5	0
Actinometer ditto ...	0	5	0
Standard Hygrometer ditto ...	0	5	0
Solar Radiation Thermometer in vacuo ...	0	7	6
Standard Maximum, Minimum, or Reference Thermometers, to the Freezing Point of Mercury ...	0	15	0

NEGRETTI AND ZAMBRA'S PATENT RECORDING THERMOMETER.

L. S. d.

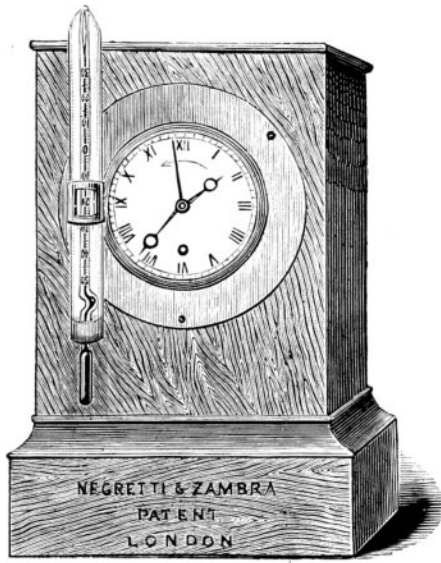
69. The construction of this Thermometer is shown in the figure, and from this it will be seen that there is a minute contraction of the bore at (A), upon the shape and fineness of which depends the successful action of the instrument.



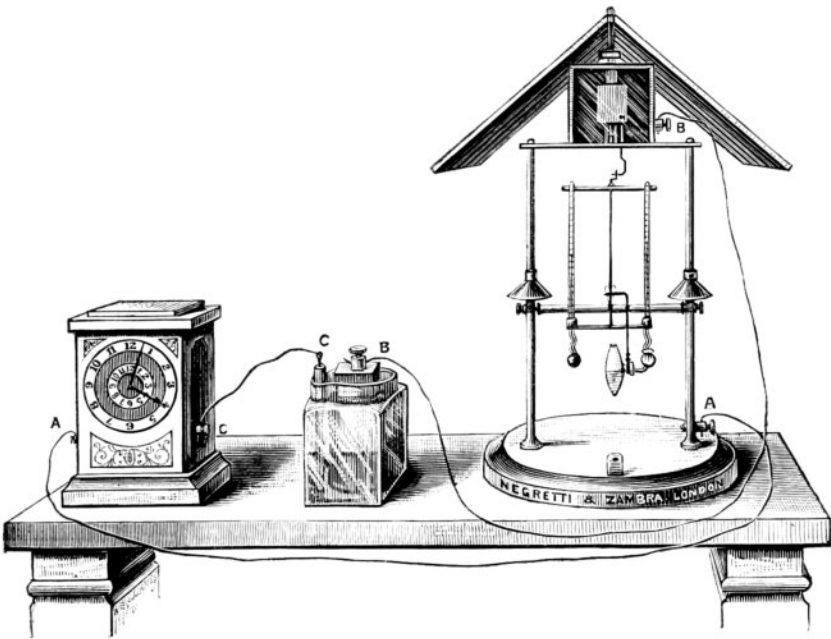
Below this is constructed a small reservoir (B), and at the bottom of the tube is blown a small cavity (c) which permits of the expansion of the mercury when the Thermometer is being carried with the bulb downwards. It has before now occurred that the weight of the mercury in the bulb through a shock or jar has forced a small portion beyond the contraction; therefore all these Thermometers are now constructed with another fine contraction in the bore at (D), which has the desired effect of sustaining the weight without in any way interfering with the successful action.

When the Thermometer is in use, it is placed with the bulb downwards, and the mercury rises and falls in precisely the same way as in an ordinary Thermometer. When the moment arrives at which it is desired to take the temperature, the Thermometer is reversed, the bulb then coming uppermost. The mercury column at this moment instantly parts at (A), and falls by its own weight to the bottom of the tube indicating on the graduated scale which reads upwards from (c) the actual temperature at the moment of reversal. Should the temperature increase between the time of reversal, and the moment of observation, this will make absolutely no difference to the column, because any mercury which is forced by expansion past the contraction (A), either remains there through capillarity or falls into the reservoir (B).

The graduations are 1° Fahrenheit or $\cdot 5^{\circ}$ Centigrade, but may be sub-divided to $\cdot 5^{\circ}$ Fahrenheit or $\cdot 2^{\circ}$ Centigrade at slightly increased prices. The range is usually -10° to $+90^{\circ}$ Fahrenheit or -25° to $+40^{\circ}$ Centigrade, but if special ranges are required, the cost is considerably increased, and NEGRETTI & ZAMBRA will be glad to give quotations on receipt of full particulars.



70



71

£ s. d.

NEGRETTI & ZAMBRA'S Patent Recording Thermometer is fitted up in many useful types of apparatus, of which the following are some of the most usual.

70. As an **Hourly or Daily Atmospheric Temperature Recorder**, it is fitted on a frame which is reversed automatically at any given hour or moment by a clock movement.

This apparatus is of no slight use to observers who are desirous of taking additional readings at times when it would be inconvenient to have to read the ordinary Thermometers

4 4 0

71. As a **Recording Hygrometer**, two Thermometers are mounted side by side in a metal frame, the wet bulb having a small water vessel close by it with the usual supply of wick and muslin as conductor.

The reversal is effected by an Electro-Magnet, protected from the weather by an oak box with metal cover; upon the detent being released, the metal frame falls over owing to its centre of gravity being above the axis, and the two Thermometers act as previously described.

The current is generated by a wet or dry battery, and the contact is made by the hour hand of the clock at any specified moment.

The great advantage that this instrument possesses is, that the Hygrometer may be freely exposed at any distance away from the clock, which may be placed in the house or office

10 10 0

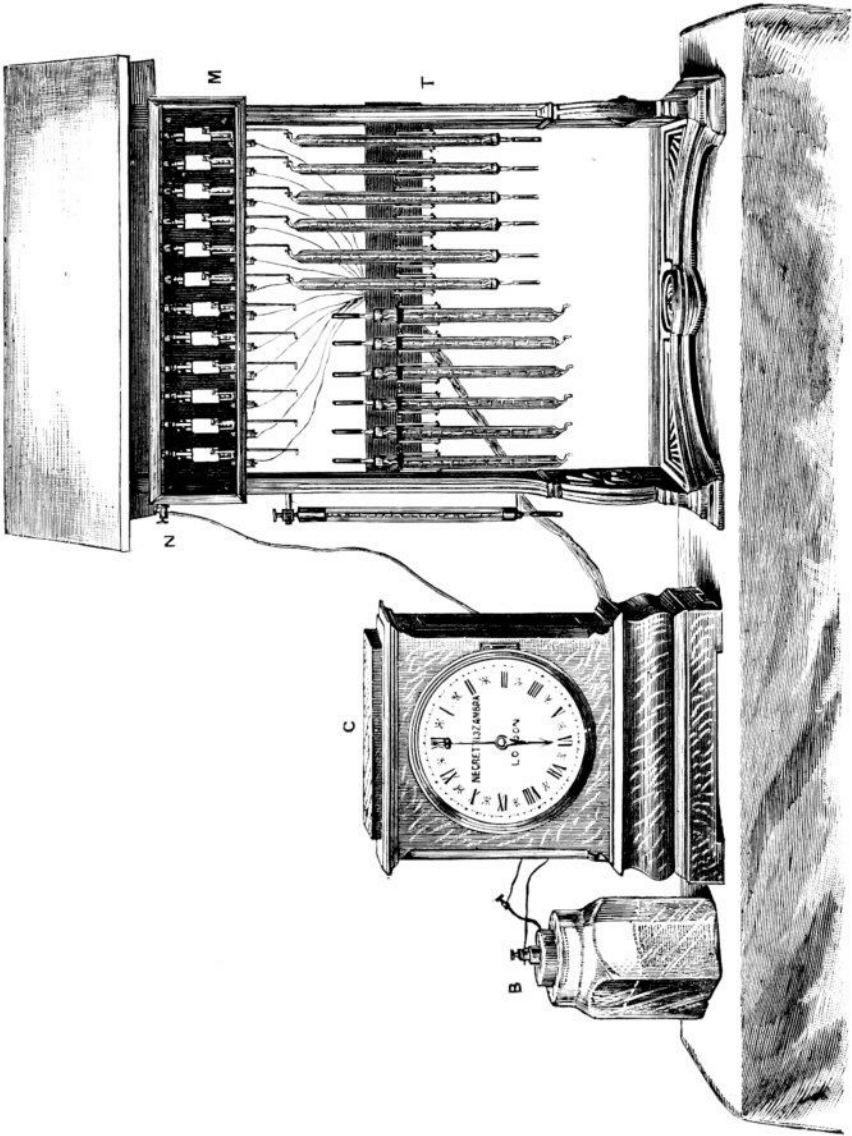
72. As a complete **Hourly Temperature Recorder**, six or twelve of NEGRETTI & ZAMBRA'S patent Thermometers, on the principle described above, are mounted in an iron frame, and connected electrically with a special clock, provided with a separate connection and circuit for each hour (or at any time desired).

The releasing action and consequent reversal of each Thermometer is precisely as described in the Hygrometer

52 10 0

73. Kew Certificate for NEGRETTI & ZAMBRA'S Recording Thermometer

0 5 0



STANDARD DEEP-SEA THERMOMETERS.

Deep Sea Thermometers are constructed on two principles, both of which are in general use.

They are:—

Firstly.—The “**Miller**” pattern, which registers the Maximum and Minimum Temperatures during a sounding.

Secondly.—**Negretti & Zambra’s Patent Reversing Pattern**, which registers the actual temperature at any given depth.

£ s. d.

All NEGRETTI & ZAMBRA’s Deep-Sea Thermometers are guaranteed to withstand a pressure of **450 atmospheres**, or 3-tons pressure per square inch, and may be tested by the Authorities of the National Physical Laboratory for this pressure, and also for corrections to be applied to the scale readings.

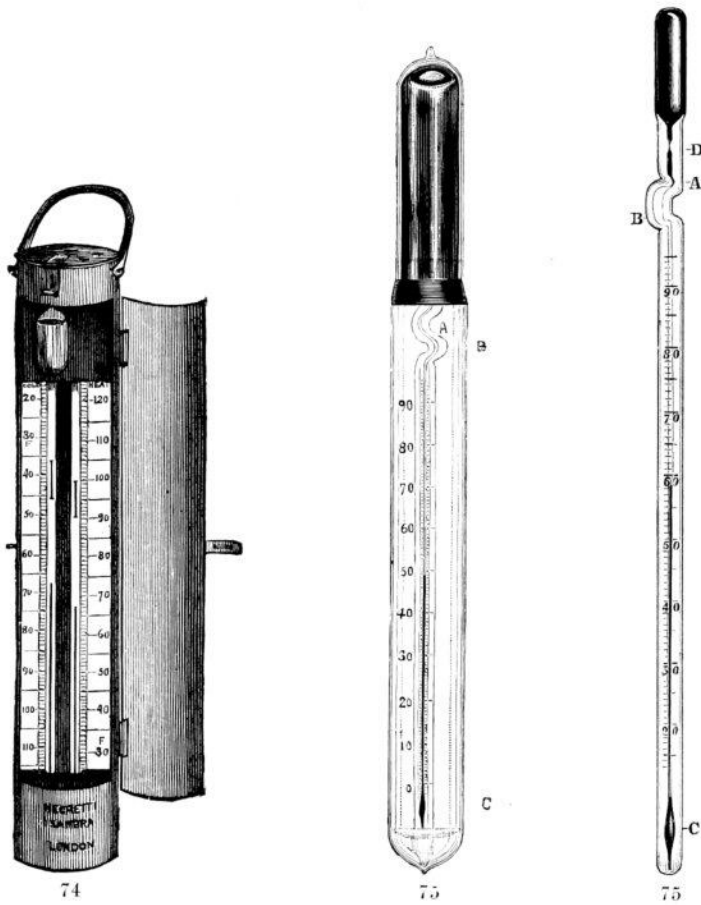
Certificate as above 0 7 6

74. The “**Miller**” pattern is a Six’s Thermometer which NEGRETTI & ZAMBRA construct with a special bulb, in order to withstand the hydrostatic pressure at great depths, sometimes $3\frac{1}{2}$ or 4 tons per square inch.

The Thermometric bulb is encased in a strong outer sheath of glass, and in order to avoid the non-conductivity of the space between the bulb and the sheath, it is filled with spirit.

The Thermometer tube itself is graduated in 1° Fahrenheit or .5° Centigrade, and mounted on ebonite to withstand the action of the sea water, with opal scales on which are indelibly fired the figures. The complete Thermometer is fitted into a strong copper case with lid, and firm brass handle for attachment to the line ...

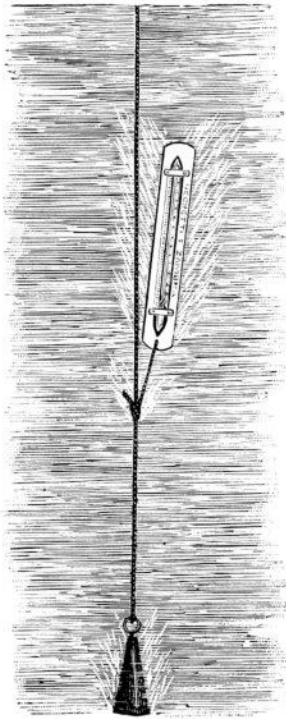
2 10 0



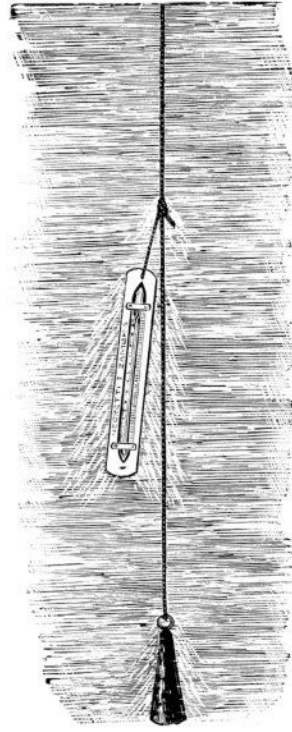
75. The Negretti & Zambra Patent Deep-Sea Thermometer is constructed on identically the same principle as described on page 23, but, in addition, it is securely protected against the pressure of the ocean.

£ s. d.

This is effected by enclosing the Thermometer tube in a strong hermetically sealed glass sheath. In order to ensure that the readings are sensitive and rapid, the space between the mercury bulb and sheath is filled with mercury, which is the best possible conductor 2 0 0



76
DESCENDING.



76
ASCENDING.

£ s. d.

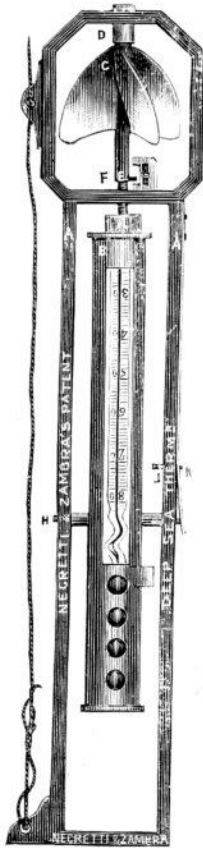
Many frames for mechanically reversing the NEGRETTI & ZAMBRA Deep Sea Thermometer are in use, and mention is here only made of three most usual ones.

For shallow waters, lakes, etc., it is sufficient to fit the Thermometer securely into a strong, varnished wood mount, as shown above, having a good brass eye at the end nearest the bulb, by which a cord is attached from the frame to the sounding line.

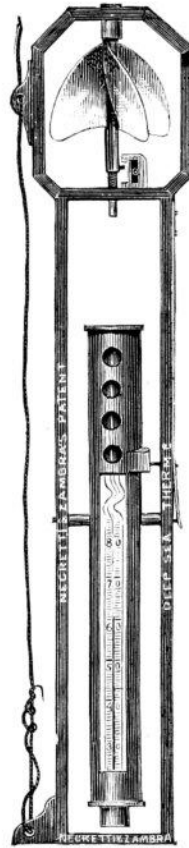
In descending, the Thermometer will be pulled down with the bulb downwards; and upon being pulled up it will at once turn over and come up bulb uppermost.

76. **Negretti & Zambra's Deep-Sea Thermometer.** Mounted as described above

2 10 0



77



77

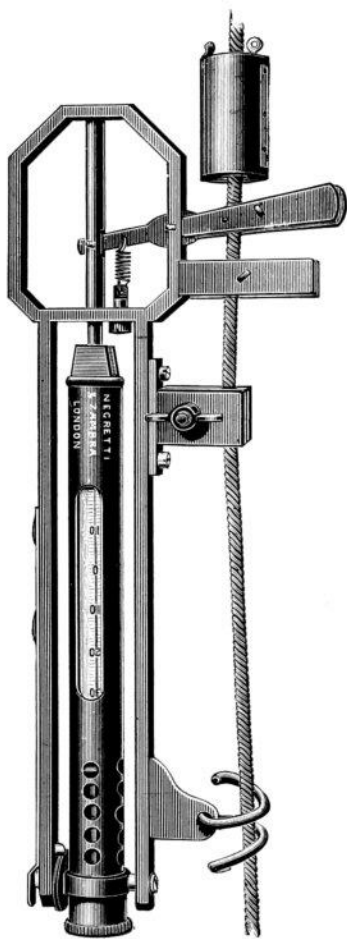
£ s. d.

For **Deep-Sea Sounding**, the Thermometer is securely fitted with rubber packings into a strong bronzed brass reversing frame, designed by Admiral **Magnaghi** of the Royal Italian Navy.

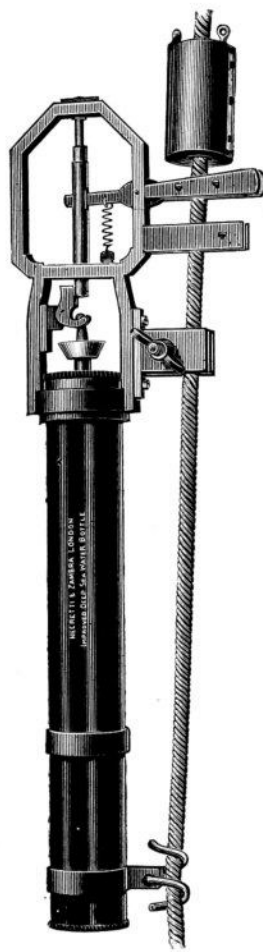
The principle is that of a screw-fan, which, when descending, locks the frame with the Thermometer, but which, when ascending, the force of the water causes to revolve, raising the screw pin and releasing the Thermometer frame; as the centre of gravity is above the axis, this frame reverses, and the Thermometer records the actual temperature at the moment of reversal.

77. **Negretti & Zambra's Deep-Sea Thermometer** in **Magnaghi** pattern frame

5 10 0



78



79

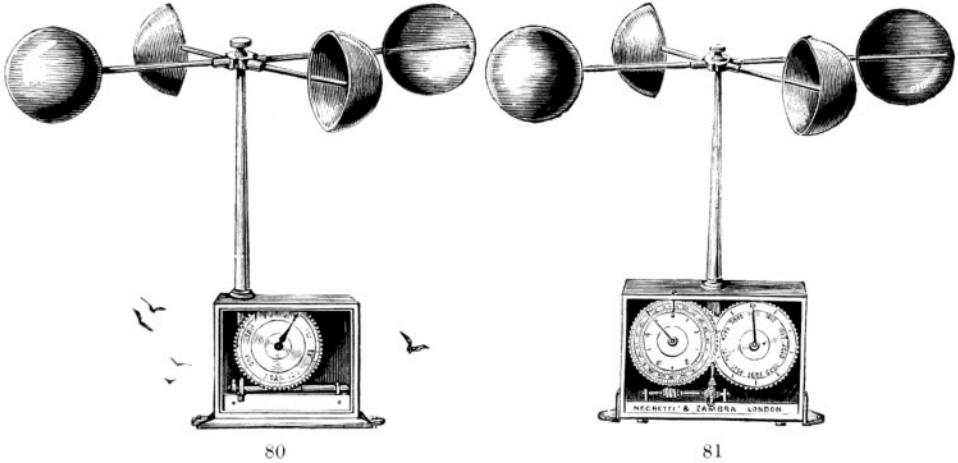
Another frame in frequent use is the pattern invented by Dr. Mills, and adopted by the Scottish Fishery Board.

£ s. d.

The form is like the preceding, but the release is effected by a lever instead of a screw fan. This lever can be depressed at any desired moment by a weight or messenger, which upon being loosed from the ship, will travel down the sounding line.

- | | | |
|-----|--|--------|
| 78. | Negretti & Zambra's Deep-Sea Thermometer in Scottish Pattern Frame , with messenger and 6 spare springs... .. | 7 0 0 |
| | Extra messengers each | 0 15 0 |
| 79. | Deep-Sea Water Bottle , for bringing to the surface a sample of the water at any required depth. The release is effected by mechanism identical with that described above. Complete with messenger and 6 springs in case | 6 0 0 |

ANEMOMETERS.



£ s. d.

80. **Anemometer, Robinson's Pattern**, is universally adopted as the Standard type for indicating the Velocity of the Wind.

The gearing is so calculated, that the dials indicate the actual velocity of the wind for any definite time as noted by a watch or clock.

The outer dial is graduated in divisions of—
 ·1 mile up to 5 miles.

The inner dial is graduated in divisions of—
 5 miles up to 505 miles,

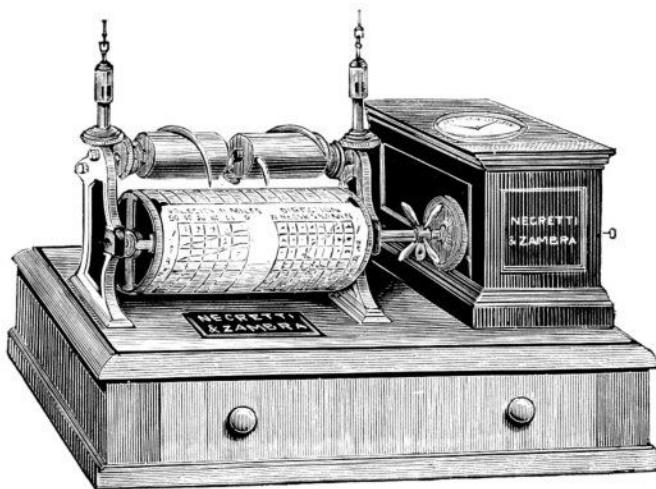
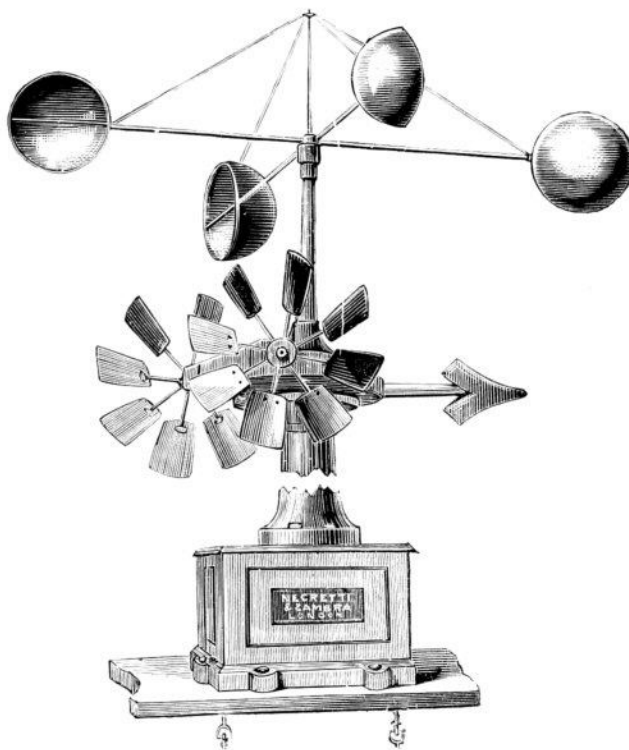
or if graduated on the Metric System—
 ·1 kilometre to 10 kilometres, and
 10 kilometres to 1,010 ditto

The mechanism is securely enclosed in a cast-iron frame with strong glass front 4 10 0

81. **Anemometer**, as described above, but with an additional geared wheel and dial, carrying the registrations to 5,050 miles or 10,100 kilometres 5 15 0

82. **Anemometer**, as described in No. 80, fitted with double-tailed **Wind Vane**, and the four Cardinal Points (N.E.S.W.) 7 7 0

83. Anemometers may be verified, and Certificate of the National Physical Laboratory issued for a sum of ... 0 15 0



£ s. d.

84. The **Self Recording Anemometer** designed by Mr. BECKLEY is a most reliable form for recording on a chart in a room, the velocity and direction of the wind as indicated by the cups and vane on the roof.

The vane consists of two parallel circular fans which transmit the varying direction of the wind with greater steadiness than can be obtained with the ordinary vane. This vane and the cups are mounted on a heavy cast iron pedestal which is fixed on the roof or some similar open spot, and their movements are transmitted by special mechanisms, rods, Hook's joints, &c., to the room wherein is placed the recording apparatus. This consists of a horizontal metal cylinder round which is placed the chart, actuated by a superior pendulum English clock movement, and making one revolution in 24 hours. The traces of the velocity and direction of the wind are marked on the chart, which is of metallic paper, by brass helical pencils as illustrated. The velocity pencil is so arranged that one revolution is equal to 50 miles, and the direction pencil has its pitch equal to the scale of the points of the compass.

Beckley's Anemometer as described above with pedestal 6 feet 6 inches high, cups 9 inches in diameter, 40 feet of tubing, supply of 400 metallic charts for one year, printed either in Kilometres or Miles 100 0 0

85. **Beckley's Anemometer**, with pedestal 3 feet 6 inches high and 5-inch cups 75 0 0

These prices are for the Anemometers as specified above, and do not in any way include the cost of installing or fixing.

NEGRETTI & ZAMBRA will be glad to quote for additional lengths of tubing or other necessary fittings when the vane cannot be placed directly over the recording apparatus, on receipt of measurements, particulars or plans.

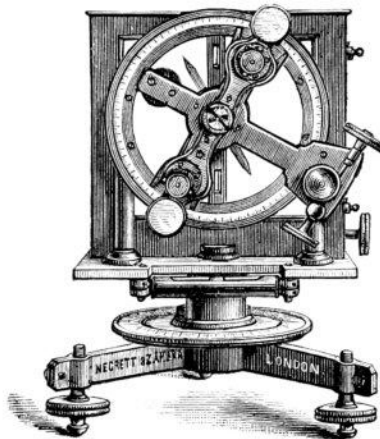
86. **Dines' Pressure Recording Anemometer.** This instrument consists of two parts—the head and the recording apparatus, which, as in the foregoing, may be placed at any distance apart.

This head consists of a vane formed of a piece of tube, with an open end, which is kept facing the wind, and into which the wind blows.

The head is connected with the recorder by two pipes of soft metal.

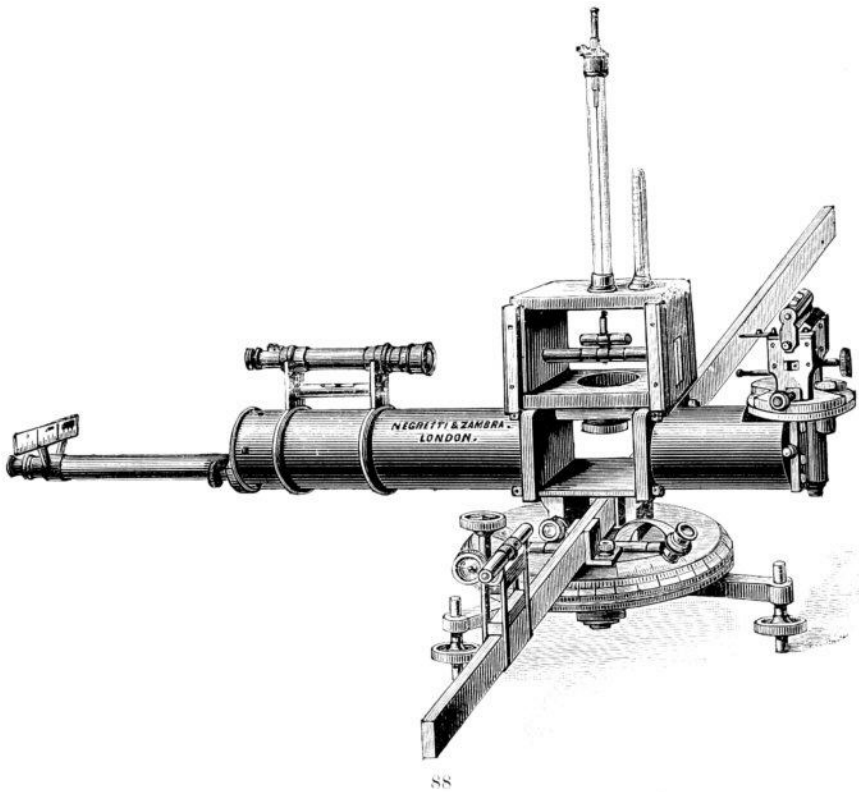
The recorder consists of a float placed in a closed vessel containing water, and this float rises or falls in accordance with the amount of wind pressure experienced at the mouth of the vane. To the top of the float is attached a rod carrying a pen, which records any variations of pressure upon a ruled chart wound on a metal cylinder, which revolves once in seven days.

The Anemometer, as described above, with supply of charts for one year 38 0 0



87

87. **Dip Circle or Inclinator.** Kew pattern, with Lloyd's total force apparatus. Complete in mahogany case, with Certificate of the National Physical Laboratory ... 48 0 0



88

88. **Magnetometer**, Unifilar, Kew pattern. For determining the horizontal component of the magnetic force of the earth, and also the declination, fitted with Rücker's Apparatus for adjusting the reflector to Telescope. Complete in mahogany case with graduated bar, solid tripod, and a Certificate of the National Physical Laboratory, giving the constants which have been computed 85 0 0

For an Observatory of the First order are required :—	Nos.
Standard Observatory Barometer	1 to 13
Standard Thermometer... ..	29 or 30
Standard Maximum Thermometer	34
Ditto Minimum ditto	36
Ditto Hygrometer	50
Solar Radiation Thermometer, with black bulb ...	41
Solar Radiation Thermometer, with black bulb, in vacuo, with test gauge	43
Solar Radiation Thermometer, with bright bulb, in vacuo, with test gauge	43
Terrestrial Radiation Thermometer, with link bulb	40
Stevenson's Thermometer Screen	55
8-inch Glaisher's Rain Gauge, Copper, with two measures (<i>see separate price list.</i>)	
Earth Thermometers for 1, 2, 4 and 6 feet	59
Anemometer, Robinson's with two dials	82
Sunshine Recorder, Campbell-Stokes (<i>see separate price list.</i>)	From £45 to £85.

In addition to the above it is of great use to have—

Recording Barometer.	Recording Hygrometer.
Recording Thermometer.	Recording Anemometer.
Recording Rain Gauge.	

Mr. W. Marriott, Secretary of the Royal Meteorological Society, in his book, "Hints to Meteorological Observers," gives the following directions with regard to the Equipment of Stations in the British Isles.

The Stations are of two kinds, viz. :—

A.—Second Order Stations, wherein the necessary instruments are:—	Nos.
Standard Barometer	1 to 7
(or)	
Kew Pattern Barometer	16
Wet and Dry Bulb Hygrometer	50
Maximum Thermometer	34
Minimum Thermometer	36
Rain Gauge (<i>see separate price list.</i>)	
Stevenson's Thermometer Screen	55
	From £15 to £35.

It is desirable to have also :—

	Nos.
Black Bulb Maximum Thermometer, in vacuo ...	42, 43
Bright Bulb Maximum Thermometer, in vacuo ...	42, 43
Terrestrial Radiation Minimum Thermometer ...	38, 40
	From £4 3 6 to £6.

Useful additions are:—

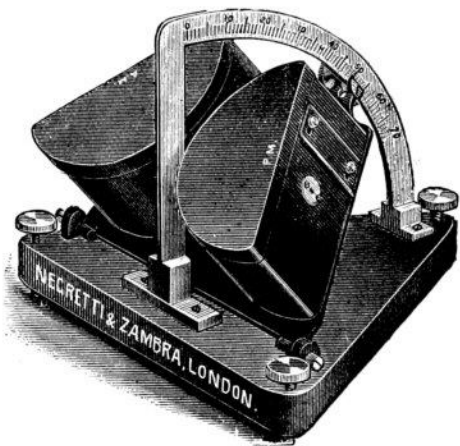
	Nos.
Earth Thermometers, 1-ft., 2-ft., and 4-ft. ...	59
Anemometer, Robinson	80
(or)	
Anemometer, Robinson	81
Sunshine Recorder, Campbell-Stokes	
(or)	
Ditto, ditto, Jordan's (<i>see separate price list.</i>)	From £11 to £24.

B.—Climatological Stations.

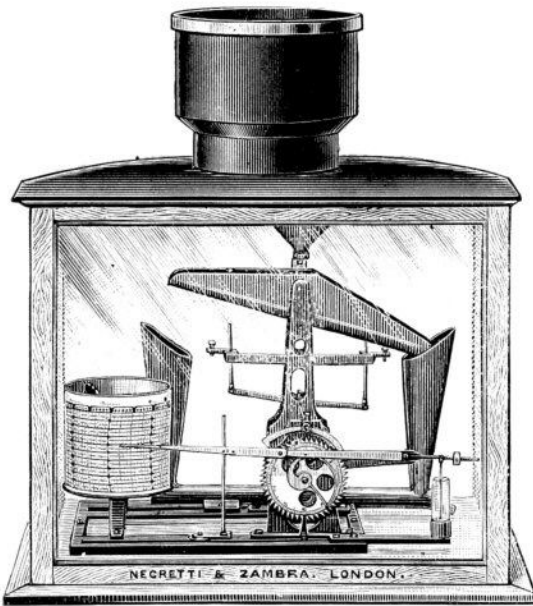
The above instruments are required, with the exception of the Barometer, which is not considered necessary. From £9 to £10 10s.



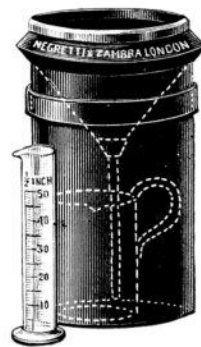
A
 SUNSHINE RECORDER.
 (CAMPBELL-STOKES' PATTERN.)



B
 SUNSHINE RECORDER.
 (JORDAN'S PATTERN.)



C
 REGISTERING RAIN GAUGE.
 (NEGRETTI & ZAMBRA'S PATTERN.)



D
 RAIN GAUGE.
 (8 in. GLAISHER'S PATTERN.)

NEGRETTI & ZAMBRA publish full particulars and prices of

**SUNSHINE RECORDERS,
 RAIN GAUGE and EVAPORIMETERS,
 REGISTERING BAROMETERS, THERMOMETERS, etc.,**

in separate price lists which they will be glad to send upon application.

PUBLICATIONS, CHARTS, Etc.

	<i>s.</i>	<i>d.</i>
Hygrometrical Tables , adapted to the use of the Wet and Dry Bulb Hygrometer, by J. GLAISHER, F.R.S.	2	6
Table of the Diurnal Range of the Barometer, by J. GLAISHER, F.R.S.	1	6
Table of the Corrections for Temperature for Barometers with Brass Scales, by J. GLAISHER, F.R.S.	1	0
Tables for Calculation of Heights from Observations of the Boiling Point of Water, by J. WELCH	1	6
Barometer Manual , or How to Foretell Weather, by Admiral FITZROY	0	6
Hints to Meteorological Observers , by WM. MARRIOTT... ..	1	6
Meteorology , by R. H. SCOTT, F.R.S.... ..	5	0
Meteorology , by J. W. MOORE, B.A., M.D., M.Ch., etc.	8	0
British Rainfall , published annually by H. SOWERBY WALLIS and H. R. MILL	10	0
<p>Negretti & Zambra's Charts for keeping a record of the variation of the Barometer and Thermometer. Each sheet is ruled and figured for one month's observations, and twelve of these sheets are neatly mounted on a board, so that when one month's readings are ended the sheet can be removed by cutting round the edge with a sharp knife, and a fresh sheet will be exposed. These records form a most interesting and valuable reference for comparing present and past weather.</p>		
Price per pad of 12 sheets for Barometer Readings	2	6
Ditto, ditto, Thermometer Readings	2	6
Ditto, ditto, Combined Barometer, Thermometers, Hygrometer, etc., etc.	2	6
Pocket Meteorological Register and Notebook , with Diagrams for exhibiting the fluctuations of the Barometer, etc., by R. STRACHAN, F.R. Met. Soc.	2	6
Meteorological Register for one year, with instructions, by G. J. SYMONS	2	0
Blank Rainfall Charts	0	3