1899

Telegraphic Address-TELEMETER, LONDON

PART II.

TEN GOLD SILVER & BRONZE MEDALS

ALSO SEVERAL FIRST CLASS DIPLOMAS & AWARDS

J. H. STEWARD'S

CATALOGUE

OF

METEOROLOGICAL INSTRUMENTS

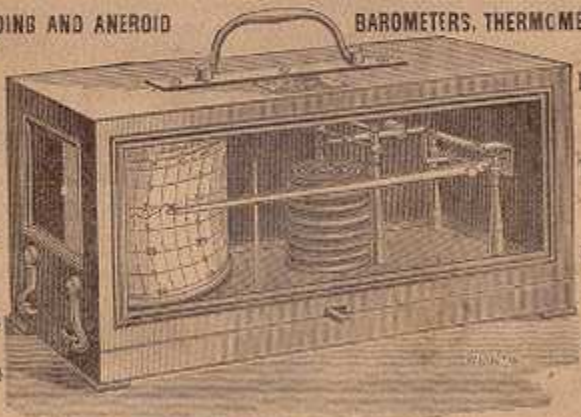
RECORDING AND ANEROID BAROMETERS, THERMOMETERS, &c.

Clinical Thermometers.

Explorers' Outfits.

Collegiate Sets.

Hygrometers



Rain Gauges.

Travellers' Outfits.

Sunshine Recorders.

Anemometers.

Optician to the British & Foreign Governments, the Universities & Colleges, and the National Rifle Associations of Great Britain, Ireland, India, Australia, Canada and America.

By Appointment.

406, STRAND, 457, WEST STRAND, W.C., 7, GRACECHURCH ST., E.C.

LONDON.

TELEPHONE { 406 STRAND — GERRARD 1867
7 GRACECHURCH ST — AVENUE 930

CONTENTS.

CONTENTS—*continued.*

BUSINESS TERMS.

All Instruments are listed at **NET PRICES FOR CASH**.

A Remittance should accompany order, or be forwarded on receipt of invoice before despatch of goods (except with registered customers having ledger accounts).

Cheques to be made payable to J. H. STEWARD, and crossed "London and Westminster Bank." Banker's Draft, which can be obtained at any bank, to be payable on demand in London.

Postal Orders or Money Orders to be payable at 369, Strand Post Office to J. H. STEWARD.

ORDERS FROM ABROAD.—To prevent error, customers abroad ordering instruments through an agent are respectfully requested to mention my name and address on the indent, and, if possible, advise me direct, and I will give personal attention to their requirements. If a copy of the portion of indent referring to my instruments can be sent me, it will facilitate execution of order.

CAUTION.—J. H. S. emphasises this matter, as cases have come to his knowledge where inferior instruments have been forwarded in place of those of his manufacture.

Special Orders to be paid for as follows—Half at time of ordering, and balance on completion.

As every care is taken in packing, J. H. S. cannot hold himself responsible for breakage in transit.

Packing Cases charged for at Cost price, and are not returnable.

Any instrument not specified in this Catalogue can be constructed or obtained for clients, and estimates and descriptions furnished when required.

Experimental work carried out under personal superintendence of a member of the firm.

Barometers, Thermometers and Scientific Apparatus generally, **REPAIRED** by skilled workmen.

Every instrument sold by J. H. STEWARD is **TESTED** and guaranteed.

J. H. STEWARD'S Only Addresses are as follows:—

406, **STRAND,** on the north side, *between* the Adelphi and Vaudeville Theatres.

457, **WEST STRAND,** on the north side, near Trafalgar Square, opposite the Grand Hotel, and next door to Charing Cross Post Office (**not** the Telegraph Office).

7, **GRACECHURCH STREET, E.C.,** west side, and south of Cornhill.

In quoting from this Catalogue, please mention the date, 1899.

INTRODUCTION.

In the following description of Barometers, Thermometers, and Meteorological Instruments, the articles to which each refers will be the best quality of its class, and each instrument is tested with a standard so that accuracy can always be guaranteed within certain small limits.

For comparative Meteorological Records by Officers of Health, Explorers, &c., some special and convenient patterns have been designed, and all the instruments are of the "Standard" order, verified at Kew.

For all practical purposes for home use, those described under the head of Mercurial Hall and Mercurial Fitzroy, are all that can be desired, and are guaranteed correct within 2-100ths of an inch. For weather forecasting and ordinary house use, the Aneroid Barometer will be found very satisfactory, and sensitive to changes of atmospheric pressure. It, moreover, has the great advantage of being able to be handled with perfect freedom, and will travel by rail without special precautions and can be laid down with impunity, should it be desired to do so at house cleaning time or in travelling.

Some new and elegant patterns have recently been added.

"Mountain Aneroid and Pocket Barometers." These are now made so accurate and perfect that elevations and depressions of 10 feet can be easily noted with those of watch size (2 inches diameter) where a maximum height of 3,000 or 4,000 feet is required; and if a pocket size instrument is used of 3 inches diameter with a Vernier scale (*see fig.* 52, *p.* 43), then elevations of 5 feet can be observed up to 8,000 or 10,000 feet.

"Vernier Readings." The adaptation of the Vernier has become possible by a modification of the movement and improved construction, so that the play of the hand is practically neutralized and the movement represents change of pressure only. These improvements also make it possible to divide the scale in equal graduation, and retain accuracy, instead of the old plan of having a gradually contracting scale and, consequently, smaller spaces as the altitude increases.

Other special patterns will be found under the head of Pocket Barometers, and particular attention is called to the **Blakesley Aneroid Barometer** on page 41. This is a distinct advance in Surveying Aneroids, and cannot be too highly recommended for use by Surveyors and Engineers, &c. A revolving scale of feet can be so adjusted that true heights are indicated at once for different air temperatures, thus saving any further calculation, which the usual form of Aneroid necessitates. All that has to be done is to move the altitude

scale up or down 1 inch for every 16 degrees of temperature (Faht.) above or below the normal of instrument, and a mechanically worked pointer indicates the position of hand. The scale is divided to give 10 feet of altitude. A magnifying lens enables the small divisions to be clearly seen, and a swing thermometer is provided (and fitted to the sling case), in order to obtain correct air temperature.

For Institutions, Piers, Hotels, and Mansions, where a vertical distance of 27 feet can be obtained below the point of observation, the **Glycerine Barometer** will be found a great attraction, for it is sensitive and has a bold appearance, and at times of storms, and atmospheric disturbance, is of special interest on account of the great length of scale (10 inches as against 1 inch of mercury), permitting the slightest movement to be readily seen. (*See p.* 15.)

"**The Fitzroy Storm Barometers,**" fitted with forecast dials and indicators, will be found useful as well as ornamental weather glasses, and when they have (as those in Catalogue) fairly large tubes, so that a large column of mercury is utilized, they will be found sensitive. They have a plug for the tubes to make them portable, and will travel under personal supervision or in charge of the guard of a train.

"**Steward's Mercurial Hall Barometers,**" of the same quality as fitted up at the principal Railway Termini and Hotels, are renowned for their sensitiveness and accuracy.

"**Greenhouse Thermometers.**" For registering the Maximum and Minimum Temperatures, the "Six's" form will be found convenient and sufficiently accurate. For Standard reading the "**Spitta**" Upright Maximum and Minimum Thermometer (fig. 69, p. 54), or those shown as separate Thermometers on page 58, are recommended.

A new form of **Upright Minimum Thermometer** has been introduced that will be found very convenient for certain positions in Greenhouses, where a horizontal pattern cannot be readily placed, and as it is set by simply inverting it, no magnet is required. The needle representing the minimum temperature floats in the spirit and is carried down as the heat decreases, and remains at the lowest point until reset on inversion, by the glass plunger in the bulb pushing it back to the present temperature. On hanging the Thermometer up again the plunger falls and the Index remains in position. (*See page* 60.)

The cheaper kinds of Minimum Thermometers answer for simple hot frames and general garden use; the Enamelled Zinc Minimum being best for exposed positions.

"**Clinical Thermometers.**" Great improvements have been made in Thermometers for medical purposes during the past few years, for not only have we accurate Thermometers reading to fifths of a degree, and a Magnifying Index to show the Maximum Temperature

reached, but there are modifications of bore to prevent the jerking of index into the bulb of mercury, and an improvement for strength (*see* "Open Scale Clinical," *page* 64) that combines the constriction of tube (for registering) with that just above the mercury bulb.

"The Automatic Setting Clinical Thermometer" is a most ingenious contrivance, and besides being very sensitive, saves the shaking and loss of time consequent on same when resetting. All that has to be done is to press a little spring plunger of metal at the top of the Thermometer and the mercury at once recedes below the scale. (*See page* 64.)

"Recording Barometers and Thermometers." The small size instruments, as described at pages 26—28, have been sufficiently long under observation to be classed among reliable instruments, and the great utility of a silent recorder for night pressure or temperature when quick changes may take place cannot be over-estimated. The Recording Barometer is also invaluable to leave at a depôt or lower station when mountain climbing, so as to afterwards make corrections for atmospheric disturbances or alteration of pressure during ascent or descent. For Mines and all places where Meteorological observations are made, a recording Barometer is invaluable, and the Recording Thermometer for use in factories affected by the Board of Trade Act, is almost indispensable; certainly it is a great safeguard and check. (*See page* 56.)

"Use of Aluminium in Manufacture of Aneroids." The increased facilities for producing Aluminium and its consequent reduction in price makes this metal of great use for articles of simple construction, such as the cases of Aneroid Barometers. The weight saved is about half, so that in the pocket sizes (2½ and 3 inches) particularly it will be a great boon to travellers. By the prices quoted it will be seen that the extra cost is not of much moment. In order to get a nice surface to engrave on and silver, the dials are still made of hard but thin brass, and so the well-known excellent appearance of first-class instruments is preserved.

Sets of Instruments have been arranged so as to suit private observers, Colleges, Schools, &c., as well as public observatories. (*See page* 48.)

Certificates from Kew can now be supplied for nearly all scientific instruments, and it is advised that all the better class should be verified at the Observatory, and a certificate of necessary corrections obtained. J. H. S. undertakes this work for customers, and his own stock of standard instruments are all Kew verified. (*See page* 69.)

Sunshine Recorders of improved make from the design of Mr. J. B. Jordan, are added to this list (*see page* 70); also the Campbell-Stokes Sunshine Recorder (*p.* 70).

BAROMETERS.

The Barometer is an instrument for measuring the weight or the pressure of the atmosphere.

The Mercurial Barometer was invented by an Italian (Toricelli) in 1640. Its construction consists in hermetically sealing one end of a glass tube, which is then filled with mercury and all air excluded. The open end being inverted and placed in a cistern containing the same fluid, the column of mercury falls until it arrives at a stationary point, indicating the pressure that the atmosphere then exerts on the surface of the mercury in the cistern.

The mercurial column, therefore, acts as a counterpoise to the weight of the atmosphere, and the atmospheric fluctuations which take place are recorded by the rise and fall of the column of mercury.

Owing to mercury being subject to alterations of volume from changes of temperature, the height of the Barometrical column must be always reduced to a standard temperature, in order to determine exactly the pressure due to the atmosphere alone. For the sake of convenient comparison, the freezing point (32° Faht.) has been universally adopted, as the temperature to which all readirgs are reduced.

In like manner the mercury is affected by the alteration of pressure due to altitude, for a Barometer placed at (say) 180 feet altitude would indicate about 2-10ths of an inch lower than one situated at sea level. All readings, therefore, that are taken, and are used at any time for comparison, must be corrected to what is known as Sea Level. In the above instance the correction would be plus, but when observations are taken below sea level, the correction is minus.

For altitudes below 1,000 feet above sea level a sufficiently exact correction is to add one-tenth (0.1) of an inch for every 90 feet above sea level; and for temperature deduct 3 one-hundredths (0 03) for every 10 degrees above freezing point (32° Faht.)

Minor corrections for capillarity and the effect of Temperature on the Barometer scales, are taken note of in delicate observations.

Tables have been calculated and constructed to facilitate these corrections and will be found in text books on the subject. (*See page* 69.)

J. H. STEWARD, 406, 457, STRAND, W.C.; 7, GRACECHURCH STREET, E.C., LONDON.

Fig. 1.—Price £4 15 0 & £8 8 0

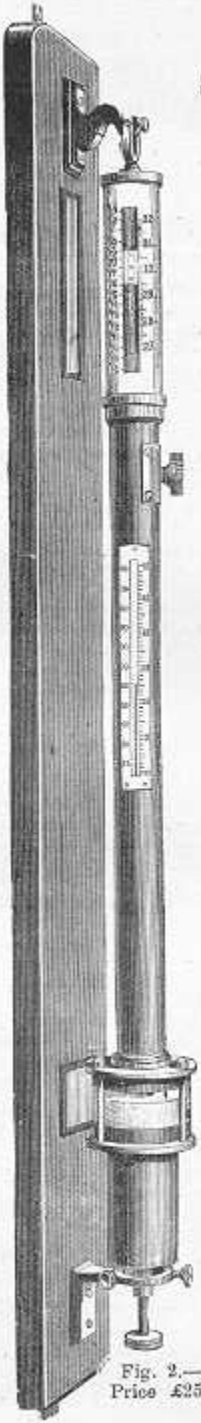


Fig. 2.—Price £25

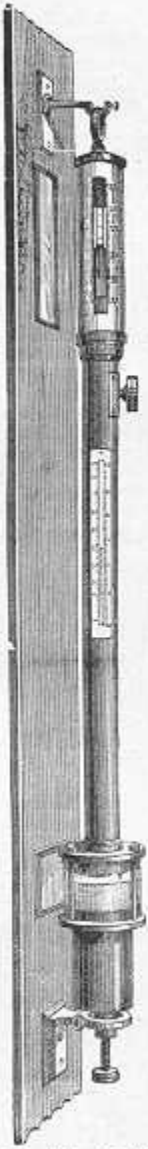


Fig. 3.—Price £10 10s.

STANDARD BAROMETERS.

The best instrument for use at Meteorological Stations, Observatories, and Scientific Institutions, where exact observations are necessary, is the Standard Barometer on Fortins' principle, with an adjustment for maintaining the mercury in the Cistern at a constant level, or for very careful and special observations the Newman's pattern (No. 4), Royal Society's Kew Standard.

*No. 1. **Standard Mercurial Barometer**, on the Kew principle, of the best construction; inside diameter of Tube 0·35 of an inch, graduated to read by means of Verniers to 1-500th and by estimation to 1-1000th of an inch, with scale arranged to compensate for rise and fall of Mercury in the Cistern; a Standard Thermometer is fitted so as to be in contact with Barometer Tube, fig. 1. Price ... £8 8 0

*No. 2. **The "Meteorologist's" Kew Standard Barometer**, (Fortins'), of improved make and the very highest finish; inside diameter of the Tube ·50 of an inch, English Scale, reading by means of Verniers to 1-500th (and by estimation to ·001 inch) and Metric Scale reading to one-tenth of a millimètre. The Cistern is arranged with a screw so that at each observation the top of the Mercury can be adjusted to the fixed ivory point which can be seen through the glass portion of Cistern. In the front of Barometer is fixed a Thermometer of Standard make with divisions etched on the Tube. The Board is of polished mahogony, and has opal glass plates let in to facilitate reading of Barometer, and adjusting Cistern. The Brackets to support the instrument are of bronzed brass, and are made so that the instrument can be turned to suit the light; adjusting screws are fitted for setting instrument vertical (see fig. 3, p. 7) ... ... Price ... £10 10 0

No. 3. **The "Observatory" Kew Standard Barometer** (Fortins' principle), of larger size than above, but otherwise of same style and finish. It is extra sensitive, the inside diameter of Tube is ·75 of an inch, graduated to read by means of Verniers to the 1-500th inch, and one-tenth of a millimètre (see fig. 2, p. 7). All of the highest finish, and specially suited for public or private observations, complete with attached Standard Thermometer, Price 25 0 0

*No. 4. **The Royal Society Kew Standard Barometer**, (Newman's principle), consisting of a pedestal of Cast Iron, so arranged as to contain and support a large tube of mercury. By means of rackwork the scales on each side can be set to the level of the Mercury in Cistern, and thus the fiducial point is preserved, 30 inches on the scale being always 30 inches from the top of the Mercury in the Cistern when set to take readings of Barometer by the rack and pinion Vernier. Internal diameter of Tube ·80 inch. The whole mounted for durability, together with an attached Kew Standard Thermometer ... ... Price ... 35 0 0

*No. 5. **The "Collegiate" Standard Barometer**, on the Kew principle, inside diameter of Tube 0·3 inch. Scale reading by means of Vernier to 1-500th inch. The graduations are contracted so as to compensate for rise and fall of the Mercury in the Cistern. Rackwork to Vernier and engraved scale; also Thermometer, Fig. 1, p. 7. ... ... Price £4 15 0

This will be found to be a very useful instrument for Schools, Colleges, &c., for comparative work and instruction of pupils.

Standard Barometers Mounted for use with Cathetometers to Order

*No. 6. **Superior "Collegiate" Standard Barometer,** constructed on the Kew principle, inside diameter of Tube 0·5inch, Scale reading by rackwork Vernier to 1-500th of an inch. Standard Thermometer, mahogany board with adjustment for keeping Barometer vertical. The graduations are contracted so as to compensate for rise and fall of Mercury in the Cistern ... ... Price ... £6 6 0

Similar to fig. 1, p. 7—and of larger size than No. 5.

***Fiducial Point Reader.** This accessory, which can be used on any Fortins' Standard Barometer, facilitates the setting of the mercury to the point where it just touches the ivory pointer,—a matter of no small difficulty in certain lights. It consists of a reading microscope on a hinged pivot, the whole clamping on to the ordinary cistern mount ... ... Price ... 0 15 0

***Glass Cases,** for Standard Barometer, with ebonized polished beading and back, plate glass sides and hinged door in front forming an excellent and neat protection to instrument from dust, &c.

Small Sizes	...	...	...	...	...	...	...	2	10 0
Medium "	...	...	...	...	...	...	...	3	5 0
Large "	...	...	...	...	...	...	...	4	0 0

J. H. STEWARD'S

PRESENTATION BAROMETER.

(Registered Design.)

This handsome instrument has been designed so that customers can have a pattern Barometer that is no way hackneyed. It has been registered as a copyright design, and so cannot be copied in inferior style as has been so often done with other designs introduced and not registered. The Frame is of Solid Mahogany, the carving is of superior order, and the whole is produced in best possible style. The Scales are enamelled glass with letters and divisions burnt in, modified Fitzroy weather indications being written on same. Two Verniers worked by keys below the scales enable readings to be taken to 1-100th of an inch, and the pointers show the height of mercury yesterday and to-day. The Tube is of large size (·5-inch bore), and the mercury column shows slight fluctuations (fall or rise) very quickly. The Cistern is fitted with screw for making the instrument portable. A best quality Thermometer is fitted in the body of the instrument. Total length, 3 ft. 8 ins.; greatest width, 9½ ins.; fig. 4, p. 10. ... ... Price ... £12 12 0

J. H. Steward's Extra Large Size Presentation Parometer, with bolder Tube, having 0.75-inch Bore, suitable for very large Halls or Institutions, same design as fig. 4... ... ... Price £15 15 0

The above can be supplied in Fumigated Oak or other woods as desired.

Silver Plates Engraved, with inscription ... from ... 0 15 0
Packing Case 0 5 0

The Toricelli Presentation Barometer, Carved Oak Frame and bold Tube having a ·75-inch bore. Enamelled Glass Scales, two Verniers reading to 1-100th of an inch, attached Thermometer. See fig. 5, p. 10 Price ... 12 12 0

PRESENTATION BAROMETERS.

(*See page 9.*)

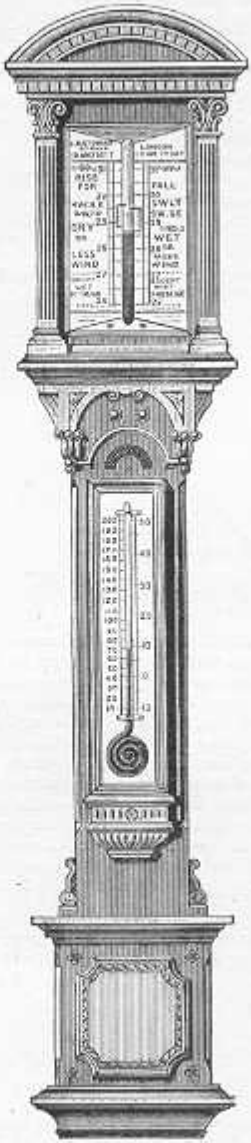


Fig. 4.—**Steward's Registered Pattern.** Price £12 12s. & £15 15s.

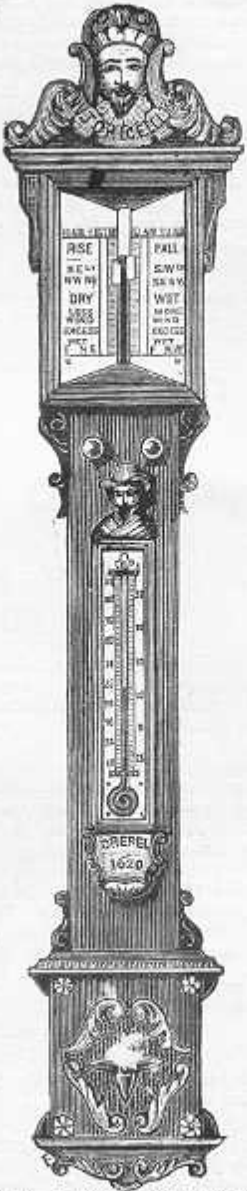


Fig. 5.—**Presentation Toricelli Barometer.** Price £12 12s.

J. H. STEWARD'S

MERCURIAL HALL BAROMETERS.

OF MEDIUM AND LARGE SIZE.

Sea Coast Fitzroy Barometer, of best quality, in Solid Oak, Round Top Frame, with Enamelled Glass Scales, which enables the words, figures, and divisions to be easily seen, large bore mercurial tube, Double Vernier, reading to 100th of an inch, and Thermometer ... ... Price £5 5 0

The Sea Coast Barometer, in strong Square Top Oak or Walnut Frame of superior quality, with Double Scales and Verniers reading to ·01 inch, and bold tube (see Fig. 5, p. 12) ... ... Price £4 15 0

Fitzroy Barometer, in Handsomely Carved Oak Frame, with Enamelled Glass Scales, having words and divisions that are very legible and durable; Large Tube, 2 Rack Verniers, reading to 100th of an inch, and Double Scale Thermometer, as used at the **Railway Termini** and **Hotels** (see Fig 7, p. 12) ... ... Price £6 10 0

In the above all the work is of *best quality*, and the tubes are of large size, so that the bold Mercurial column shows changes of pressure quickly. The frames are solidly built, so that exposure to the atmosphere does not unduly affect them.

Any of the above patterns can be supplied in mahogany or walnut.

MERCURIAL HALL BAROMETERS.

OF SMALLER [SIZE.

***The Cottage Mercurial Barometer**; Ivorine or Porcelain Scale, with Vernier, and Thermometer attached, in polished Mahogany, Walnut, Oak, or Rosewood Frame, with screw to cistern to make instrument portable (see Fig 10, p. 13)	£1	1	0
Ditto, Solid Frame Protecting Tube, superior finish ... ... Price	2	2	0
The Farmer's Barometer, in Plain Oak Frame, with Thermometer and Hygrometer attached, Ivory Scale, Vernier, &c. (see Fig. 9, p. 13)	2	2	0
Miner's or Pit Barometer; compact Solid Oak Frame (screwed), Compensated Tube, Ivory Scale reading to 33 inches, attached Enamelled Thermometer, Single Vernier with Rack and Pinion Adjustments, strong Glass Front framed in Bronzed Metal... ...	2	2	0
The Fitzroy Barometer, in Solid Oak Frame, with 2 Verniers, and attached Thermometer (see Fig. 11, p. 13)	2	10	0
Fitzroy Barometer, in Small Carved Oak Frame, Enamelled Scales, Double Vernier, with Rack and Pinion Adjustments, attached Thermometer (see Fig. 8, p. 12). Very substantial and elegant	£3	10	0

This Barometer is fitted with a good size tube, having a large surface of Mercury to be acted upon. The Verniers enable as small a variation as one-hundredth of an inch to be observed. Each instrument is adjusted by a Kew Standard Barometer, and for all ordinary purposes can be strongly recommended.

MERCURIAL HALL BAROMETERS.

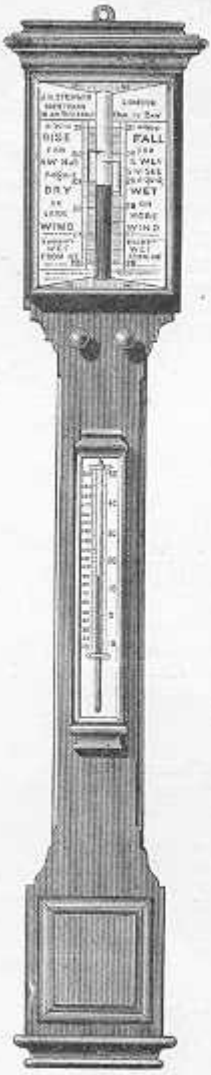


Fig. 6.—£4 15 0

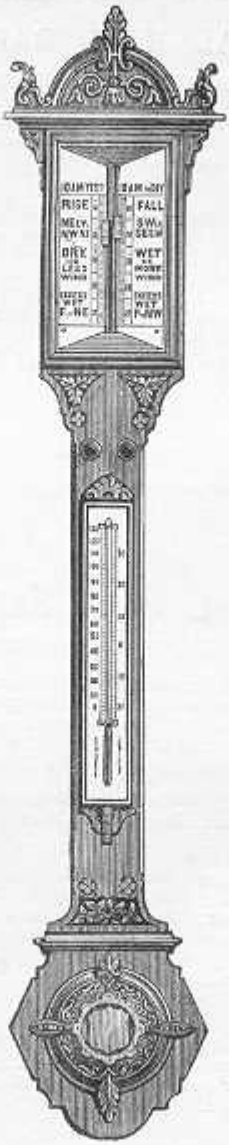


Fig. 7.—£6 10 0

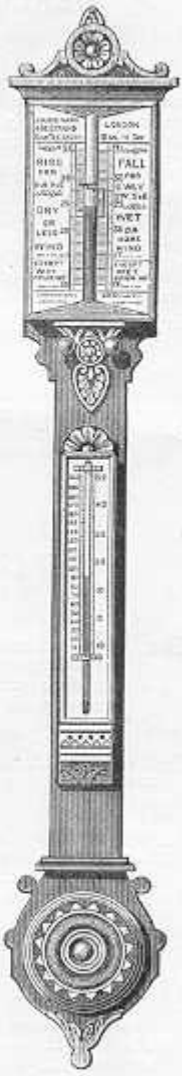


Fig. 8.—£3 10 0

SMALL SIZE.

HALL MERCURIAL BAROMETERS.

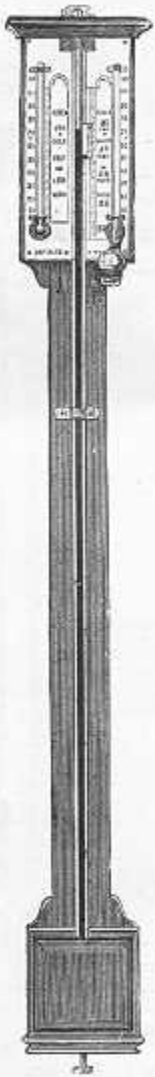


Fig. 9.—£2 2s.

Fig. 10.
Price £1 1s.

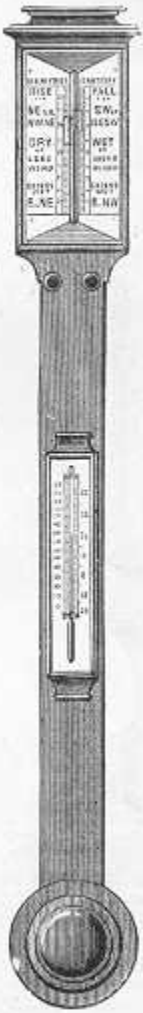


Fig. 11.—£2 10s.

BOARD OF TRADE PATTERN.

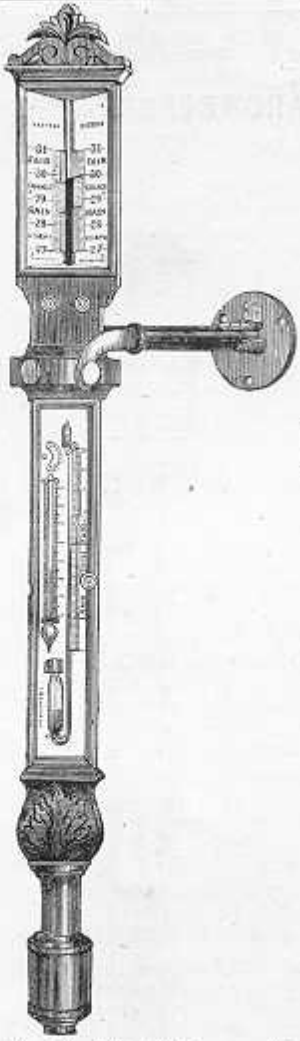


Fig. 12.—Price £6 6s.

Fig. 13.—Price £4 15s.

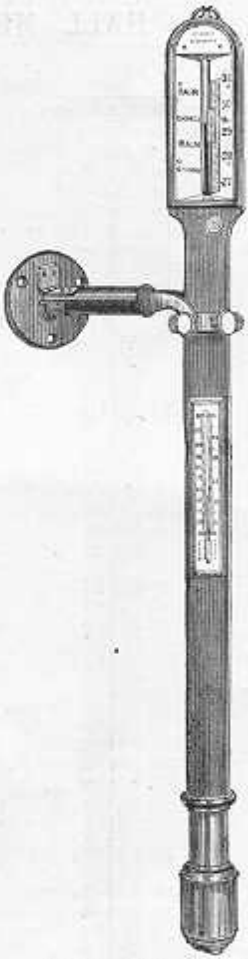


Fig. 14.—Price £2 10s.

Marine Barometer and Sympiesometer. Oak, Mahogany, or Walnut Frame, Mercurial Column of best construction, double Verniers reading to ·01 in., complete fittings, with superior Arm and Gimbals (see Fig. 12) 5 5 0

Marine Barometer, having Mercurial Tube in plain Oak or Walnut Frame, Thermometer in front, complete fittings, with superior Brass Arm and Gimbals (see Fig. 14) 2 10 0

***Marine Barometer,** Board of Trade Pattern, as supplied to the Admiralty, the Board of Trade, the Argentine, Chilian and Japanese Navies, &c.; Mercurial Column in Metal Frame, with Vernier reading to 1-500th inch, Bracket Suspension Arm, complete in Case (see Fig. 13) 4 15 0

JORDAN'S GLYCERINE BAROMETER.

MADE BY J. H. STEWARD

By Special Arrangement with the Inventor, Mr. JAMES B. JORDAN, of the ROYAL SCHOOL OF MINES, from Drawings and particulars supplied by him.

Price from £20.

This instrument has been designed for the purpose of affording a delicate "Weather Glass," indicating small changes of atmospheric pressure by *large* oscillations of a fluid column of Glycerine, at the same time preserving all the accuracy of the Mercurial Barometer. It requires a vertical height of 27 feet from the cistern to the scale, and then shows about 10 inches for the equivalent of one inch in the mercurial column.

Double scale showing actual index of glycerine pressure and the equivalent pressure of mercury inches.

This is similar to the Instrument fitted up at "*The Times*" Office, also to those fitted up by J.H.S. at Folkestone Harbour, 406, Strand, 457, West Strand, Kew Observatory, &c.

TORICELLI FITZROY STORM BAROMETERS.

(*See page* 16 *for Illustrations.*)

These Instruments have a very imposing appearance, and while useful as weather glasses, form ornamental pieces of furniture. The Storm indications, and weather forecasts are intelligibly arranged, and the indices move when the pointers are set each morning, and show the probable weather to follow, according to Summer or Winter Season, or Warm or Cold weather.

The Toricelli Fitzroy or Storm Barometer, in handsome Carved Oak frame, 8 inch Circular dial with 2 Indices, and forecast Scales—Mercurial Column, Storm Glass, and Thermometer. Improved arrangement for making portable when travelling, Height 3 ft. 8 inches, width 1 foot 1½ inches—Fig. 15, p. 16 ... £4 4 0

Larger Size Toricelli Fitzroy Barometer, with 10-inch porcelain dial of special construction and design, bold tube, with very Sensitive Mercurial Column, Storm Glass, and Thermometer. Improved arrangement for making portable. Size of frame, 3 ft. 10 ins. long by 1 ft. 2 ins wide—Fig. 16, p. 16 ... ... 6 6 0

DIRECTIONS FOR TRANSIT OF INSTRUMENTS.

Mercurial Barometer. Before moving a Mercurial Barometer take care to find out its construction, and if necessary to examine it, keep it upright in doing so. By this is meant that Wheel Mercurial Barometers, Toricelli, and other open end tube Barometers, must not be laid down until the open ends have been stopped by plugs of cotton wool or those provided with the instrument. Standard and Mercurial Barometers are made portable by being gently turned upside down, and the screw at bottom turned up by one of the keys that work the Verniers of scales (with the Mercurial), and by the milled head screw with the Standard, until there is only *just a little* play left for the mercury. This is in case of alteration in pressure or temperature causing an expansion of mercury, but it must not be sufficient for the full weight of mercury to strike against end of tube.

Packing Cases should be made large enough so that at least an inch of packing can be placed all round the Instrument, so that no jar affects it in travelling by rail or otherwise, and when addressed should be marked "With Care."

Mercurial Fitzroy Toricelli Barometers.

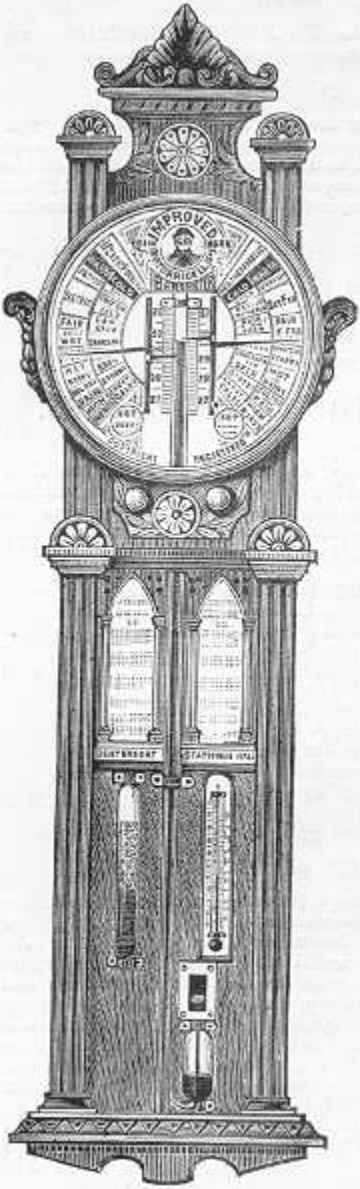


Fig. 15.—Price £4 4s.

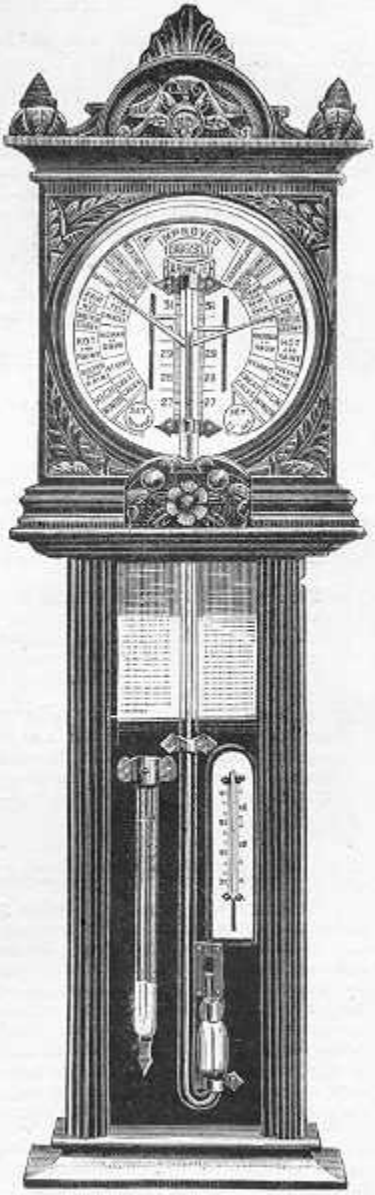


Fig. 16.—Price £6 6s.

Mercurial Fitzroy Storm Barometer.

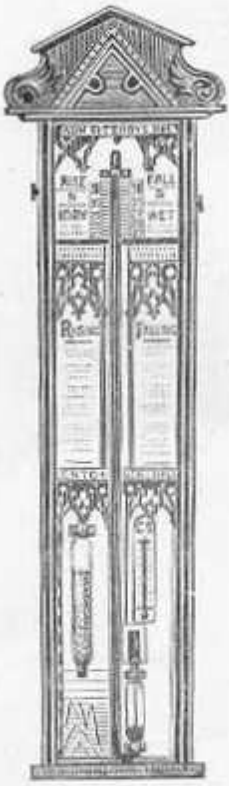


Fig. 17.—£1 10s.

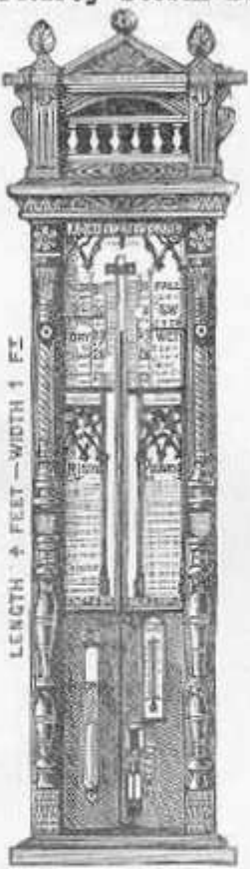


Fig. 18.—£3 10s.

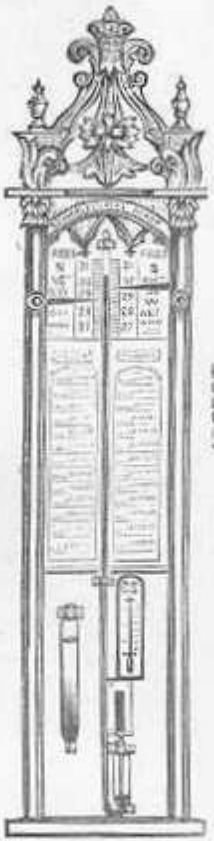


Fig. 19.—£2 15s.

The Mercurial Fitzroy Storm Barometer. In this particular form of instrument the whole of the tube is exposed. Immediately under the Barometer Scales, and on either side of the tube, is printed a very comprehensive code of instructions and remarks, by studying which it will enable one to more readily foretell coming weather. At the bottom of the Frame, on the left-hand side, is what is known as a Storm Glass. The tube of this glass is partially filled with a chemical mixture of camphor and alcohol. At the approach of a high wind, these crystals rise into the upper portion of the fluid, and in calm, fine weather they settle at the bottom. Opposite this Glass is a Thermometer, indicating the temperature of the air. The price varies according to the size (in diameter) of the tube, and general style of the frame. An ingenious plug and stop arrangement is attached for fixing the mercury in the tube, so as to avoid damage in transit.

Plain Oxford Frame, 2 Setting Indices	£1	1	0
Carved Oak Frame, Double Vernier, Rack and Pinion Adjustment (Fig. 17)	1	10	0
Gothic ditto ditto (Fig. 19)	2	15	0
Highly finished, very handsome Frame, bold Tube, and Thermometer with Enamelled Tube (see Fig. 18)	3	10	0

ANEROID BAROMETERS.

The Aneroid Barometer came into use in this country about 1844, and owing to improvements since effected, it has largely superseded the Mercurial Barometer as a household instrument, on account of its indications having a wider range and more apparent sensitiveness, the movement of the hand at once showing small changes of atmospheric pressure, which are scarcely perceptible in the slower acting mercurial column. Its mechanism is also less liable to become deranged, especially in the improved forms now employed.

Chiefly owing to the various metals used in the mechanism of the Aneroid, which are susceptible to molecular changes, it will never quite replace the Mercurial Barometer as a Standard Instrument for exact observations, but when properly constructed (which is not always the case with the ordinary article of commerce) it takes one of the highest places as a Meteorological instrument, and is most useful in giving early indications of any coming change in the weather. This valuable quality has been testified to by the most eminent authorities and professed meteorologists, and is highly appreciated by the mariner and the colonist, to whom early warning of the coming storm is of such importance.

In its most compact form, owing to its portability and to the fact that the action of the instrument is not affected by any motion, the Aneroid is peculiarly adapted to meet the wants of the Engineer, the Surveyor, and the Explorer. It is invaluable for ascertaining heights, differences of level, and meteorological changes. These same qualities render it a most interesting companion to the Mountain Climber, the Tourist, and the Cyclist.

The construction of the Aneroid consists principally of a circular corrugated metallic box, exhausted of air and hermetically sealed. One side of this vacuum box is permanently fixed to the base of the instrument and the upper side is attached to a spring having sufficient power to hold the side distended. A series of levers and articulations attached to the counteracting spring are so fixed that the pulsations of the vacuum box, due to changes of atmospheric pressure, are communicated to an index hand which moves around a graduated dial divided to represent atmospheric pressure in inches of mercury, or their equivalent in metric measure. For measuring heights, and differences of level, an additional circle of graduations representing feet or metres, as desired, and known as the altitude scale, is engraved on the dial.

All Instruments are made with great care, and after being adjusted are tested by comparison with a Standard Mercurial Barometer connected with an air pump, the Aneroid being placed in one chamber and the Mercurial Barometer in the other.

Customers can see the Pocket Instruments so tested at the time of purchase if they like to do so.

The Aneroid Barometer is a most suitable instrument for placing at the entrance to mines, in accordance with the Act of Parliament, an extract of which is given below—

COAL MINES REGULATION ACT, 1887—Rule 33.

"A Barometer and Thermometer shall be placed above ground in a conspicuous position near the entrance to the mine."

J. H. STEWARD, 406, 457, STRAND, W.C.; 7, GRACECHURCH STREET, E.C., LONDON.

STEWARD'S REGISTERED PATTERN BAROMETER. (*Copyright*)

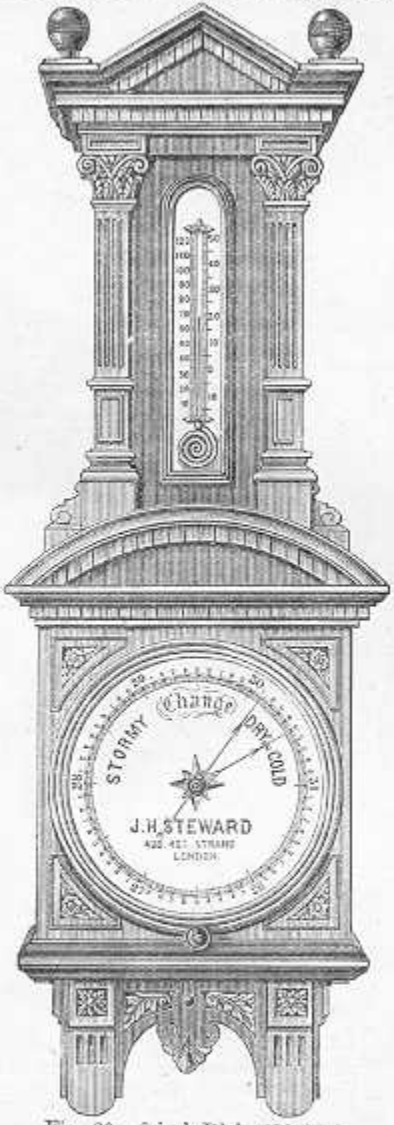


Fig. 20.—8-inch Dial, £10 10 0

J. H. Steward's Best Quality "Registered" Aneroid Barometer, with handsome Carved Frame and Enamelled Glass Dial, 8 ins. diameter, index hand setting by a key beneath the dial. Superior movement compensated for temperature and best Spiral Bulb Thermometer (Fig. 20) £10 10 0

Larger size ditto, for Institutions and large buildings 10-inch dial ... 15 15 0

Do. do. do. 12 ,, ... 21 0 0

ANEROID BAROMETERS,

WITH CARVED WOOD FRAMES, SUITABLE FOR HALLS, &c.

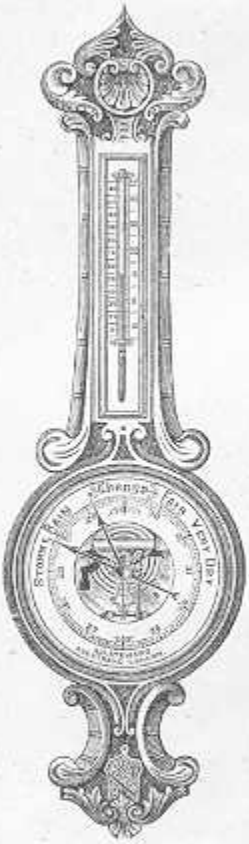


Fig. 21.—£3 10 0

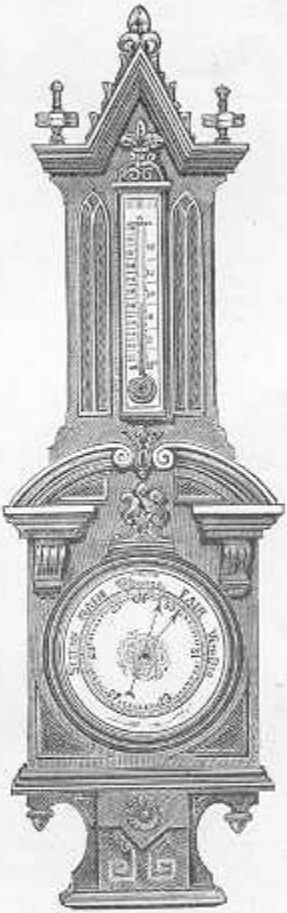


Fig. 22.—£6 16 0

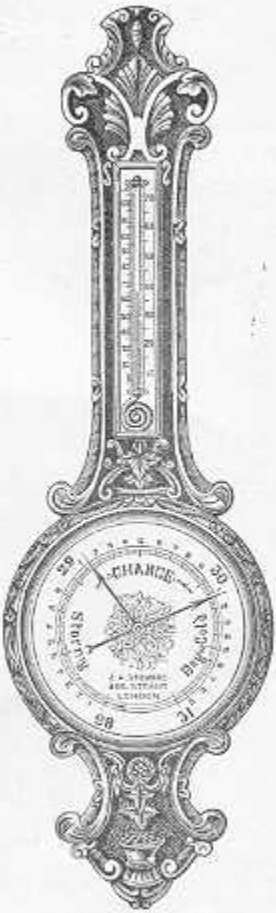


Fig. 23.—£7 15 0

Aneroid Barometer, with Solid Carved Oak Frame, 8-inch Dial, with attached Thermometer, frame similar to Fig. 21, but with Closed Dial. Length of frame 33 inches, extreme width 10 inches ... ... Price £2 15 0

Ditto ditto very handsome Frame, 8-inch Open Dial, with visible movement, superior quality. Fig. 21 ... ... Price 3 10 0

Ditto, with Carved Oak Frame, 8-inch Silvered Metal Dial, and Thermometer, compensated movement. Fig. 22 ... ... Price 6 15 0

Aneroid Hall Barometer, superior finish, elaborately Carved Oak Frame and Engraved Silvered Metal Dial, with attached Silvered Metal Scale Thermometer to match. Extreme length 33½ inches, width 10½ inches. Something like Fig. 23, p. 20 ... ... Price £4 15 0

Ditto ditto in Mahogany, Walnut, or Rosewood Frame ... ,, 5 0 0

Aneroid Barometer, in Elaborately Carved Oak Frame, Compensated Movement ... ... Price 6 15 0

Aneroid Barometer, with Key and mechanical arrangement for setting Index, Gilt Mounts, Oak, Walnut, or Mahogany Frame. Fig. 23, page 20. Compensated for temperature, with Thermometer attached ... ... Price 7 15 0

Fig. 24.—£3 15 0

Fig. 25.—£2 2 0

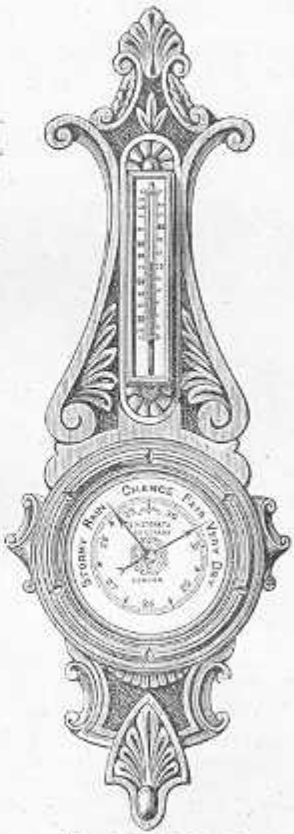


Fig. 26.—£2 10 0

Aneroid Barometer, Carved Oak Frame, with 5-inch Dial and movable Index, with Thermometer. Fig. 25 ... ... £2 2 0

Ditto ditto with Enamelled Dial and Bolder Frame—extreme height, 27 inches; extreme width, 10 inches. Fig. 26 ... Price 2 10 0

Barometer, Carved Oak Frame, with superior movement, 6-inch Engraved Metal Dial with Thermometer. Fig. 24 ... ... Price 3 15 0

ANEROID BAROMETERS.

TO HANG UP OR STAND.

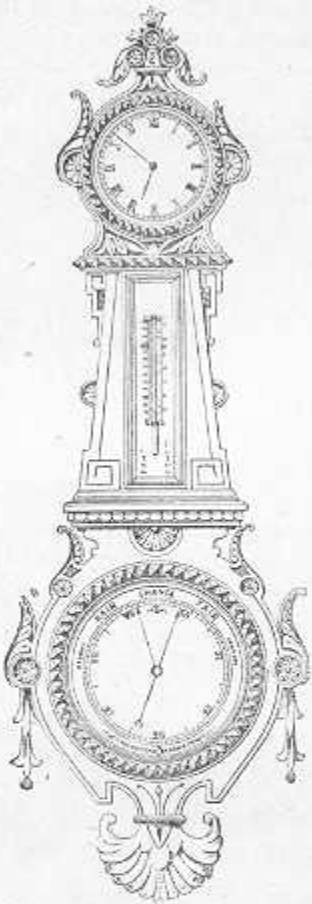


Fig. 27.—£6 15 0

Fig. 28.—£5 15 0

Fig. 29.—£4 4 0

Aneroid Barometer and Clock in Carved Oak Frame, with 8-inch Enamelled Dial for Aneroid, Porcelain Scale Thermometer, 8-day Cylinder Clock with 5-inch Dial. Fig. 27. ... ... £6 15 0

Ditto ditto in simpler frame, Aneroid Barometer with 6 in. Dial, and 8-day Clock 4 10 0

Aneroid Barometer and Clock in Elaborately Carved Oak Frame, the Barometer has a best movement, and the 8-day Clock is guaranteed ... ...£8 8 0 to 12 12 0

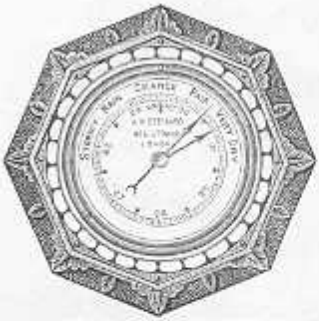
Aneroid Barometer in Carved Oak Frame to Stand, best quality 5-inch Silvered Metal Dial and Thermometer. Fig. 28. ... ... 5 15 0

Ditto ditto other patterns and Enamelled Dial ... from 3 10 0

Aneroid Barometer, in Carved Frame, to hang up, Silvered Metal Dial and Thermometer. Fig. 29. ... ... 4 4 0

ANEROID BAROMETERS.

FOR THE LIBRARY, STUDY, OR YACHT, FROM 25/- TO 90/-



OCTAGONAL PATTERN.
Fig. 30.—£1 15 0

RAISED CIRCLE PATTERN.
Fig. 31.—£2 2 0

SERRATED CIRCLE PATTERN.
Fig. 32.—5-inch, £3 10 0
Do. 8-inch, 4 10 0

ROPE PATTERN.
Fig. 33.—5-inch, £1 10 0
Do. 8-inch, 2 5 0

Aneroid Barometer, with 5-inch Enamelled Dial, Circular Carved Frame, strong Plate Glass Front, with Index Hand and Bronzed Bezel £1 5 0

Aneroid Barometer in Carved Oak Circular Frame, 5-inch Enamelled Card Dial, with Thermometer attached, suitable for Yachts, Library, or Hall, frame like Fig. 32 or Fig. 30 ... ... 1 15 0

Ditto with superior Engraved Dial, and Compensated movement, best quality. (Fig 32) 3 10 0

Ditto ditto 8-inch Dial, Silvered and Engraved centre (Fig. 32) 4 10 0

Rope Pattern Barometer, in Carved Oak, with 5-inch Dial, and Index Hand (Fig. 33) 1 10 0

Ditto ditto, 8-inch dial 2 5 0

Aneroid Barometer, with Carved and Ebonized Frame, and Thermometer (Fig. 31) 2 2 0

(Fig. 32 can be supplied in Mahogany or Walnut Frame.)

YACHT AND SHIP'S CABIN BAROMETER AND CLOCK.

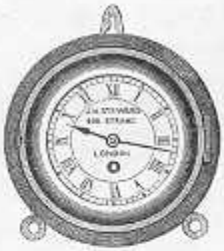


Fig. 34.
Price £3 3 0
and £4 4 0

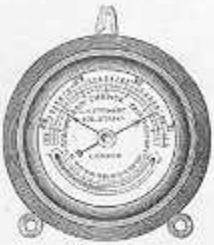


Fig. 35.
Price £2 15 0
and £3 3 0

SERIES A.

Yacht or Cabin Aneroid Barometer, with 3½-in. Engraved Dial, in Bronzed Metal Case £2 15 0

Yacht or Cabin Clock, to match Aneroid, fitted with strong Horizontal movement 3 3 0

5-inch Engraved Dial Ship's Aneroid, with Thermometer in Bronzed Cylindrical Case (Fig. 35) 3 3 0

5-inch Lever Clock, to match (Fig. 34)... ... ... 4 4 0

The sizes quoted represent the diameter of the dials. Other sizes and styles supplied to order.

The above are also suitable for placing at the entrance of mines in accordance with the Act of Parliament.

SERIES B.

New Model Barometer for Ship or Cabin use, 5-inch Enamelled Dial, in strong bright or bronzed brass case, with flange and plates for screws, very clear division and words, rain, change, fair, &c. Somewhat similar to Fig. 35 ... ... £1 5 0

Ditto ditto 8-inch, Enamelled dial. Somewhat similar to Fig. 35 2 2 0

Brass Clock, to match the above, with best American lever movement that will keep good time, 5-inch dial, to wind up and regulate from the front, strongly made. Somewhat similar to Fig. 34 ... 1 10 0

Ditto ditto 8-inch dial. Somewhat similar to Fig. 34 ... ... 2 10 0

These Aneroid Barometers and Clocks form useful instruments for Shooting Boxes, Golf Club Houses, Sea-Side Fishing Cottages, &c., being strong and durable.

COMBINED BAROMETER AND CLOCK

OF HIGHEST QUALITY, from £3 10s. to £12 12s.

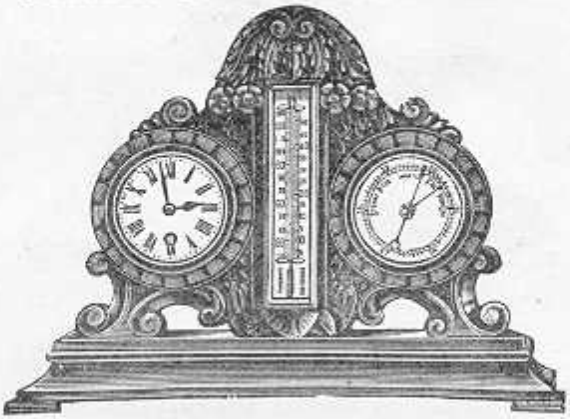


Fig. 36.

Barometer and Clock in Carved Oak Frame, with upright Thermometer in centre, consisting of Sensitive Aneroid Barometer with Enamelled Dial 4 inches diameter, and 8-day clock to match: Thermometer with Fahrenheit and Centigrade Scales. Fig. 36 ... £3 10 0

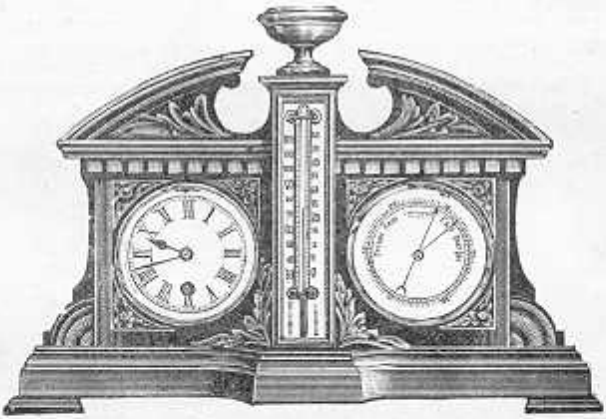


Fig. 37.

Barometer and Clock in Carved Oak Frame, Aneroid Barometer with Fancy Dial to same, forming an elegant and useful Birthday or Wedding Present. Fig. 37 ... ... £4 10 0

BAROMETERS AND CLOCKS CLEANED AND ADJUSTED.

SPECIAL INSTRUMENTS DESIGNED to suit Furniture or Decorations.

COMBINED BAROMETER AND CLOCK.

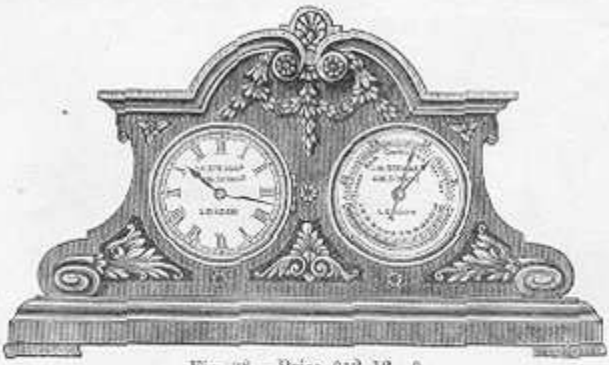


Fig. 38.—Price £12 12 0

Carved Oak or Mahogany Aneroid Barometer and Clock.—This elegant instrument has been designed to suit a library or hall, and can either stand on a Shelf or Sideboard, or be placed on a bracket. It can be supplied in any Wood, but is kept in stock in Solid Mahogany. The Clock will go in any position, and is guaranteed a good timekeeper, while the Aneroid Barometer and Thermometer are of best quality and accurate, with 5-inch Silvered Dials. Size—height 13 inches, base 22½ inches. *Fig.* 38. ... ...£12 12 0

IMPROVED RECORDING BAROMETER.

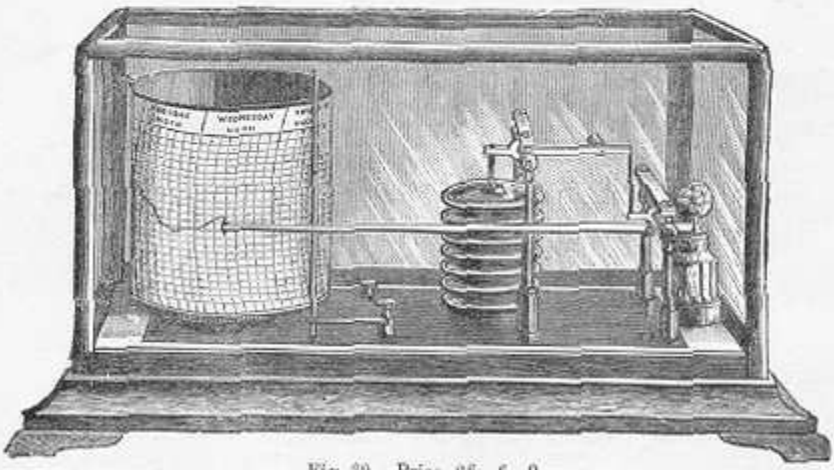


Fig. 39.—Price £6 6 0

Portable Recording Barometer, with extra sensitive Vacuum Boxes and Special Pen for continuously registering the pressure of the atmosphere. 8-day Clockwork with horizontal movement to drum for revolving Chart, which shows time, and pressure in inches. Mahogany Stand with removable Glass Cover. Fig. 39. Price, with set of 52 Charts £6 6 0

PORTABLE RECORDING BAROMETER.

ENGLISH MANUFACTURE.

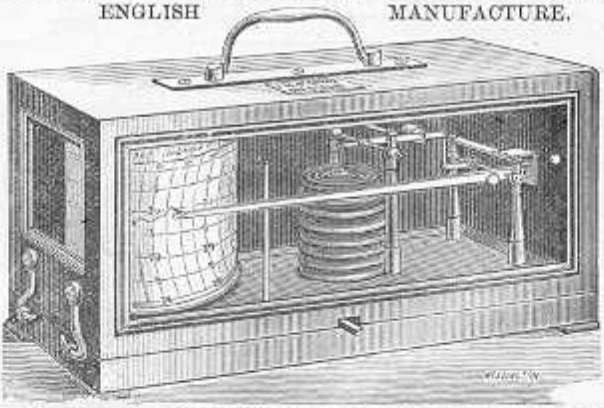


Fig. 40.—SIZE 11 INCHES LONG, 6 INCHES HIGH, 5 INCHES DEEP.

PRICE £5 15 0

WITH SET OF 52 WEEKLY CHARTS.

This Instrument is extremely sensitive and accurate, and very portable. It can be moved about without fear of deranging the works, and only requires attention once a week.

Self-Recording Barometer, as figured above, with works that consist of a series of vacuum boxes attached together, connected by a lever having a counterpoise fixed to it. The variations of atmospheric pressure act on the vacuum boxes as in the ordinary Aneroid Barometer, an increase or decrease of pressure causing them to contract or expand. This action is considerably increased by multiplying levers connected with a long arm having a pen attached to the end which marks on a chart. This chart is placed on a cylinder containing clockwork, with horizontal movement, which causes it to make one revolution in a week, and as it is divided longitudinally into days and hours and horizontally into inches and tenths, the exact height of the Barometer is registered continuously. Adjustments are provided for setting the instrument to agree with a Standard Barometer, also for adjusting the pen position and pressure on the paper, and for putting the instrument in and out of action.

The pen only requires filling once a week with the prepared ink (Aniline mixed with Glycerine) supplied with the instrument, and the chart is easily replaced by a fresh one when the clock is wound up weekly, a strip of metal keeping the ends of the paper down. The time can be told by estimation to within a quarter of an hour.

The whole works are contained in a Mahogany Case, 11 inches long, 6 inches high, and 5 inches deep, with a glass front.

Several of these have been supplied to scientific gentlemen, yachtsmen, &c., and are giving great satisfaction, both from their sensitiveness, accuracy, and simplicity, Fig. 40 ... ... £5 15 0

Self-Recording Barometer, with Bevelled Glass Cover, and with drawer in bottom to contain set of Charts, also a Thermometer fixed between the chart drum and vacuum boxes 7 7 0

(For Recording Thermometer on similar system, see Fig. 70, page 56.)

Extra bottle of specially prepared Ink 1/6, new Pen 1/6, extra Set of Charts, 5/6.

Suspender, for use in Yachts, Spring Universal Fitting, to reduce jar and keep Barometer horizontal 1 5 0

Extra Small Size Self-Recording Barometer, of somewhat similar form to the above, 7 × 4½ × 4 ... ... 4 0 0

SELF-RECORDING BAROMETERS.

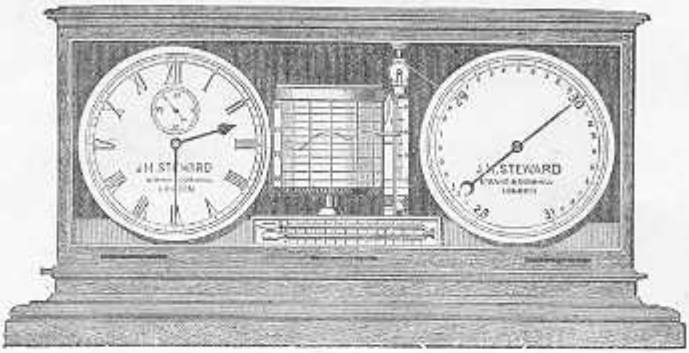


Fig. 41.

J. H. STEWARD'S IMPROVED HOURLY SELF-RECORDING ANEROID BAROMETER.

Price ... ... £25.

This instrument is designed to indicate the alterations of atmospheric pressure which take place during each hour of the day. It consists of an Aneroid Barometer, having a large vacuum, which is very sensitive to slight atmospheric changes. The dial gives a very open range sufficient to indicate any changes that may take place, and is divided to read to 100ths of an inch. The clock is an eight-day movement of best London construction, and the dials of each instrument are 8 inches in diameter. Between the Clock and Aneroid, a cylinder, 4 inches in diameter, is placed in a vertical position. The lower part of the cylinder is furnished with a toothed wheel, so constructed that it works into an endless screw, which is attached to the mechanism of the Clock at the back, and by means of which the cylinder is caused to revolve. Close to the cylinder is a vertical scale, corresponding to the Barometric inches of the Aneroid dial. A carrier of metal containing a pencil is connected by means of a fine chain to the mechanism of the Aneroid. The changes taking place in the Barometer, and indicated by the pointer on the dial, are reproduced by the pointer moving up and down the vertical scale. A mechanical system connecting the vertical scale with the clockwork, causes the pencil every hour to press against a paper chart attached to the revolving cylinder, which is divided to correspond with the Barometer Scale, and thus records the atmospheric pressure. The chart only requires changing once a week, and the clock goes for eight days. A Maximum and Minimum Thermometer is attached to the instrument.

The Case is of best construction in Oak, Walnut, or Mahogany, 27 ins. long, 18¼ ins. high, 8 ins. deep, and it forms a most useful ornament to any Library, Hall, or Club Room. Price (Fig. 41), with Set of Charts for one year **£25 0 0**

Extra Charts, per set of 52, 8s. 6d.

A smaller size of this Instrument, with Lever movement instead of Pendulum, so as to go in any position, and suitable for yachts or ships ... **£30 0 0**

TRAVELLING AND TABLE BAROMETERS.

ANEROID BAROMETERS IN CIRCULAR BRASS CASES.

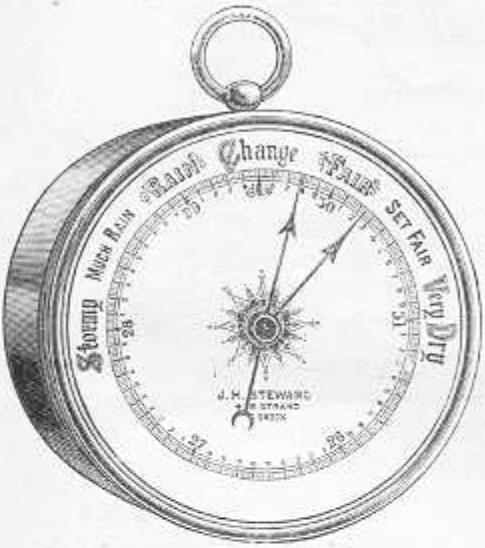


Fig. 42.—£1 1 0

BEST QUALITY 5-INCH ANEROID BAROMETERS.

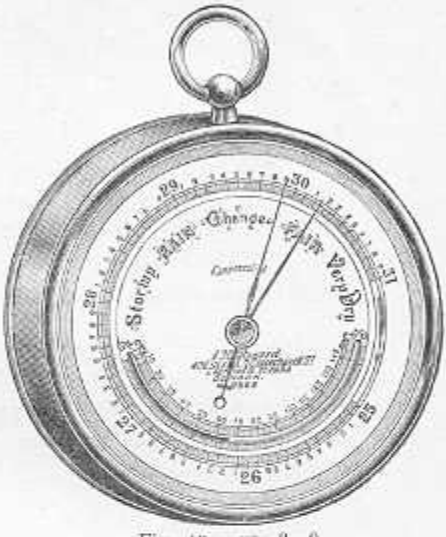


Fig. 43.—£3 3 0

Aneroid Barometer, with 5-inch Dial, and well-constructed movement, in Brass Lacquered case, and including a travelling case (Fig. 42) ... ... Price £1 1 0

Ditto ditto with Thermometer, (similar to the dial, Fig. 31, p. 23) 1 5 0

Ditto ditto with Silvered Metal Dial 1 15 0

Superior Aneroid Barometer, 5-inch engraved Silvered Metal Dial, and brass case with pendant bow. In morocco travelling case 2 5 0

Ditto ditto with Thermometer 2 10 0

Adding small feet to any of above so that they can stand, 2s. 6d.

Improved Aneroid Barometer, Best quality Compensated movement, Silvered Metal raised Dial, graduated to 100ths of an inch, from 27 to 31, with Thermometer attached, in Brass cylindrical shaped case, and including Morocco leather travelling case (Fig. 43) Price £3 3 0

Ditto ditto extra open scale and altitude scale to 4,000 ft., without Thermometer, in solid leather sling case 4 4 0

Ditto ditto with fixed or revolving altitude scale up to 10,000 ft., in solid leather sling case 5 5 0

Ditto ditto with revolving or fixed altitude scale, reading to 20,000 ft., in solid leather sling case 6 6 0

Either of the above in **Aluminium**, reducing the weight one-half, extra 1 10 0

Carved Oak or Mahogany Stands, to fit any of the above instruments, from 9s. 6d. to 30s. each.

THE POCKET ANEROID BAROMETER.

FOR MEASURING HEIGHTS, DIFFERENCE OF LEVEL BETWEEN TWO LOCALITIES, AND FOR FORETELLING METEOROLOGICAL CHANGES.

The Pocket Aneroid Barometer is the most compact and portable instrument of its class, and as it can be carried in any position and without fear of derangement or of interfering with its action, it is an invaluable adjunct to the outfit of the Engineer, the Surveyor, the Mariner, and the Explorer, and it forms a most interesting and useful companion to the Mountain Climber, the Traveller, and the Cyclist.

Not only will this instrument give the earliest indication of any coming change in the weather, which renders it of the greatest utility to the Meteorologist, but, owing to the improved method of manufacture now employed, its action is so reliable that it will indicate with wonderful precision "the height of a mountain" and "the difference of level between two places."

The Surveyor and Engineer will find the aneroid of great utility in determining slight differences in gradients, for laying down contour lines in rapid surveys, and for taking flying levels on exploring expeditions.

The Geologist, by its aid, can measure with rapidity and with sufficient accuracy the thickness of horizontal beds, and can also determine height for a geological section across any country, if the distances are known. (Unknown distances can be measured by the Steward Pocket Telemeter, which performs the operation mechanically, without calculation. For particulars, see separate pamphlet.)

To the Tourist the aneroid is an unfailing source of interest. It will help to relieve the monotony of a long railway journey by its indications of the different gradients passed over, and it will add interest to the cycling and pedestrian tour by its records of the heights of the hills climbed. In addition to all, it is invaluable for foretelling changes of the weather.

J. H. STEWARD, 406, 457, STRAND, W.C.; 7, GRACECHURCH STREET, E.C., LONDON.

The Pocket Aneroid is made in three sizes, the smallest of which is known as the "Watch" Aneroid, on account of its size and appearance being similar to those of a watch. The other two sizes are the "Pocket" and the "Surveying" Aneroid. The three sizes will be found described under their respective headings.

All aneroids when carried in the pocket or when used for surveying purposes should have a compensated movement, as otherwise a source of error is introduced by the sudden change of temperature from the pocket to the external air. A compensated movement indicates at once the true atmospheric pressure, but an aneroid that is not compensated is affected in the same manner as a mercurial barometer, but more unequally, because the various metals used in the construction vary in the degree of expansion.

When great accuracy is required in the measurement of both high and low altitudes, instruments of the very best quality and construction should be employed. In all the best instruments J. H. S. uses movements that have been made and kept for several years before being mounted and graduated. By this means the metals employed obtain a condition of stability which prevents those erratic indications which at times have brought some aneroid barometers into disrepute. Great care is taken in the selection of the vacuum boxes, and the movement is constructed on the soundest principles, so as to ensure perfect freedom of action. The pressure scales are graduated with great care, and the aneroids are adjusted to indicate with exactitude the corresponding pressures as shown by a mercurial column. The altitude scales are computed from the most approved formula, the zero adopted for revolving scale instruments being that of the approximate mean sea-level, 30 ins., and the mean air temperature, 50° Faht. Owing to the care and the time employed in perfecting the best quality aneroids, the adjustments of which have to be made by repeated testing, these instruments cannot be produced at cheaper prices than those now quoted (which have been revised). J. H. S. has now constructed a second quality series to meet the requirements of those who may desire a generally reliable instrument at a lower price. These aneroids are good weather indicators, and measure altitudes with a very close approximation to the actual height. The series have ranges of either 8,000 ft., 10,000 ft., or 12,000 ft.

WATCH SIZE BEST ANEROID BAROMETERS.

FOR MEASURING ALTITUDES AND FORETELLING COMING WEATHER.

See page 33 for description

Fig. 44.
Extra thin, £4 10s.

Fig 45.—Singer's Pearl Dial Compass with Stop, and Thermometer, £1 5s.

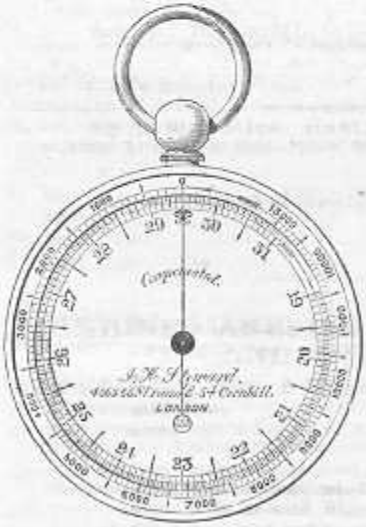


Fig 46.—Price £3 15s.

The Himalayan Aneroid
Fig. 47.—Price £5 5s.

J. H. STEWARD'S
WATCH SIZE ANEROID BAROMETERS.

FOR ASCERTAINING HEIGHT, DIFFERENCES OF LEVEL, AND SHOWING METEOROLOGICAL CHANGES.

BEST QUALITY.—Series A.

The following instruments are all of the best construction and finish, the movements being compensated for temperature. The dials which are about 2-in. diameter are made of silvered metal, having a frosted surface so as to make the graduations very legible. The inner circle of divisions is the barometrical or pressure scale, and corresponds with the scale of inches on a mercurial barometer, and is used for meteorological observations. This scale is divided up to 31 inches, each inch being subdivided to the 20th of an inch (·05), and reading by estimation to the 40th of an inch (·025). The outer circle of divisions is the altitude scale, and is used for measuring height of mountains and ascertaining differences of level between two places. The numerals on this scale represent feet, each large division representing 100 feet, and being subdivided to 50 feet; differences of altitude can be read by estimation to 25 feet or even closer. Unless specially ordered otherwise, these Aneroids are supplied with a revolving altitude scale (with the zero at 30) the outer rim of which is milled to facilitate rotation. Fig. 46 represents one of these instruments. If a fixed altitude scale is preferred, it can be supplied at the same price; the zero is then 31 inches, so that the difference of level may always be a minus quantity on the first reading. The cases of the Aneroid can be either bronzed or gilt metal. Each instrument may be tested under the air pump in connection with a Standard Mercurial, if desired at time of purchase.

No. 1.	**Watch Aneroid Barometer,** with best quality compensated movement as described above, with Altitude Scale of 9,000 feet (8,000 feet up and 1,000 feet down)	£3	3	0
No. 2.	Ditto, 11,000 feet (10,000 feet up and 1,000 feet down) ...	3	10	0
No. 3.	Ditto, 13,000 feet (12,000 feet ,, 1,000 feet ,,), fig. 46	3	15	0
No. 4.	Ditto, 16,000 feet (15,000 feet ,, 1,000 feet ,,) ...	4	4	0
No. 5.	**The "Himalayan,"** ditto, altitude scale of 20,000 feet, fig. 47	5	5	0

(For Testimonials referring to this Aneroid, see page 35.)

The prices include a morocco leather snap case.

Metric Scale. Either of the above Aneroids can be supplied with the scales divided on the metric system. The barometrical scale being divided to millimetres with numerals representing centimetres up to 79 c.m., and the altitude scale being divided to metres, each division representing 20 metres and capable of being subdivided mentally.

No. 6.	Altitude Scale up to 3,000 metres...	£3	10	0
No. 7.	,, ,, 4,000 ,, ...	3	15	0
No. 8.	,, ,, 5,000 ,, ...	4	4	0
No. 9.	,, ,, 6,500 ,, ...	5	5	0

Extras.

Fitting Stem Setting Adjustment to Altitude Scale, consisting of rack and pinion, with milled lead in bow ... ... extra	£0	10	6
Aluminium case and mounts... ... ... ,,	0	10	0
Silver ,, to watch size instruments ... ... ,,	1	10	0
Gold ,, ,, ,, ... extra from	5	0	0
Solid Leather case, with shoulder strap ... ... extra	0	8	6

Best Compass and Thermometer.—Small size best compass ¾-in. diameter, with Singer's pearl day and night floating dial, agate centre and stop action, circular thermometer mounted round the compass on ivory base to fit into the lid of the Aneroid case, see fig. 45, page 32 ... ... £1 5 0

EXTRA THIN WATCH SIZE ANEROID BAROMETERS.

Series B.

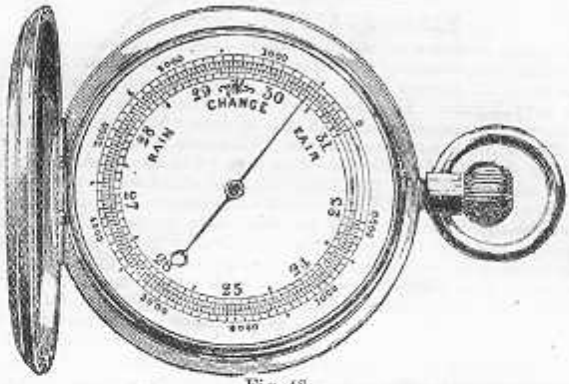


Fig. 48.

No. 10. **Extra Thin Watch Size Aneroid Barometer**, in gilt case, with compensated movement, with same Altitude Scale as those enumerated on page 33, and like fig. 44, page 32 ... ... £4 4 0

No. 11. Ditto, to higher elevations (12,000 feet) 4 10 0

If with Stem Setting Rackwork Adjustment ... ... extra 0 10 6

No. 12. **Extra Thin Aneroid Barometer**, in solid silver stem winding case, with Altitude Scale to 8,000 or 10,000 feet 5 10 0

Ditto, to 12,000 feet 5 10 0

No. 13. **Aneroid Barometer**, extra thin, in hunting case, with Stem Setting Rackwork Adjustment to set Altitude Scale of 10,000 feet, extra strong gilt or bronzed case, fig. 48 ... ... 4 15 0

No. 14. Solid Silver, ditto, ditto 6 6 0

No. 15. **Small Size Silver Hunting Case Aneroid**, with revolving Altitude Scale to 7,000 feet, and Stem Setting arrangement as in fig. 48 ... ... 5 15 0

No. 15A. **Ladies' Size Aneroid**, in Silver Case, with Open Dial, and stem setting arrangement to Altitude Scale 4 10 0

No. 15B. Ditto ditto Gilt Metal 3 10 0

No. 15C. Ditto, ditto, with Altitude Scale to set by the revolving rim 3 3 0

All the above have best Compensated Movements.

COMBINED ANEROID BAROMETER, COMPASS, AND THERMOMETER.

Combined Watch Size Aneroid Barometer, Compass, and Thermometer, in Morocco Case with lid back and front. This consists of an Aneroid Barometer with Compensated Movement and a Revolving Altitude Scale to 10,000 feet; a Singer's Patent Pearl Dial Compass and Stop, and an Enamelled Tube Thermometer mounted round same on back of instrument £5 5 0

Ditto ditto made with Milled Head in bow for setting the Altitude Scale, as shown in Fig. 44 ... ... 5 15 0

Aluminium Mounted Combined Aneroid Barometer, Compass, and Thermometer, as described above, saving about half the weight 7 7 0

TESTIMONIALS.

REFERRING TO J. H. STEWARD'S ANEROID BAROMETERS.

The following letter refers to the **Himalayan Watch Aneroid:**—

To Mr. J. H. STEWARD, Optician, &c., Westbury, Wilts.
406, Strand, London, W.C.

DEAR SIR,—I have much pleasure in bearing testimony to the accuracy and usefulness of the small 15-inch scale Pocket Aneroid Barometer I had of you six years ago, i.e. in 1874. It has been with me four times across the Atlantic, besides on voyage in the Pacific, on the West Coast of South America, and it has worked with the ship's Barometers with remarkable accuracy, only of course moving through a smaller space by reason of its larger or more extended scale. It also showed the height of the different mountains I ascended in South America, especially in Peru, where, besides visiting the Trans-Doya line of Railway, which rises to a height of more than 14,000 feet above the sea, I also visited several of the mines, which are situated at a height of 12,000 feet or more above the sea, and these heights it indicated to within a few feet of the other Barometers used by the engineers. I had previously tried it in both the Alps and the Pyrenees, in which latter it indicated accurately the heights of the Pic du Midi d'Osseau, and the Pic de Ger, as well as several of the heights of the Apennines. I consider it a thoroughly reliable Instrument for altitudes, as the little variations on the railways may also be noted by it. While it is no less useful for the weather, and the approach of the late storms of the past inclement winter and spring season of 1881 was invariably indicated by its retrograde motion and its low position until the force of the storm was about to abate. As this kind of Barometer is now used on the largest steamships, it is a proof, if others were needed, of their utility, and I gladly bear testimony to the utility of the one I had of you, which is also exceedingly convenient for its portability, and forms a most interesting and useful travelling companion, which, with use, one can hardly do without.

I remain, dear Sir,
Yours faithfully,
W. B. KEER, M.R.A.S.,
Curate in charge of Heywood, Wilts, and late British Chaplain, Valparaiso, formerly Harbour Chaplain, Bombay, &c.

The following refers to No. 5, the **Himalayan Watch Aneroid Barometer:**—

Whythank, Mussoori, N.W.P., India.

This is to certify that the Aneroid Barometer made to my order by Mr. J. H. STEWARD, of 406, Strand, London, has proved to be a most useful Instrument. As regards recording the heights of mountains, I have proved it to be wonderfully correct, on a late visit to the Himalayas; and I can most strongly recommend a similar Instrument to any who may have occasion to travel in a country whose mountains range between 5,000 and 20,000 feet. I may also add that the Instrument in question has proved itself to be a very good indicator of the state of the weather, and, when returning to India in February, 1880, it was tested on board the steamer with the ship's barometers, and found to be very sensitive and true. *I have seen, both in the country and at home, other Pocket Barometers, but none which for portability and accuracy could approach the one under notice;* and the Compass and Thermometer fitted in the lid of the case are novel, useful additions.

ROBERT PRINGLE, M.D.,
Surgeon H.M. Bengal Army, and Superintendent of Vaccination in Terra Ghurival, Himalayas.

Cape Town.

Mr. J. H. STEWARD,

DEAR SIR,—Your small Aneroid with scale of heights I had many opportunities of testing with Levels accurately fixed in Railway or large Geodetical operations, and found it extremely accurate, giving the strictly ascertained heights by levelling or other scientific operations within 3 feet, in a height of more than 3,000 feet; it is just the thing for mining, railway, or geological levelling in a country like South Africa.

Yours very faithfully,
HENRY HALL, Late Surveyor War Department.

Extract from Letter received from Colonel (then Lieut.) Jacson, 28th Regiment, in reference to one of the Watch Aneroids.

I may mention that last year I used one of your Aneroid Barometers for heights, through Corfu, the Herzegovina and Dalmatia, and down through Italy, crossing the mountains twice, which I found acted admirably.

Extract from Letter received from Professor M. Stuart Phelps, U.S.A.

I tried the Aneroid on Drachenfels to-day. Correct within six feet.

The following **Testimonial** refers to the **No. 3 Best Watch Aneroid Barometer**, with Altitude Scale to 9,000 feet:— (See page 33.)

"I have found it extremely accurate."

Mr. J. H. Steward, 406, Strand.

Monksfield, near Ryde, Isle of Wight.

SIR,—The performance of a Watch Aneroid Barometer (No. 662, compensated) which I bought of you so long ago as June, 1876, has been so remarkably good that I think I ought to let you know of it. I now find it absolutely correct on comparison with a Standard Mercurial Barometer, notwithstanding the fact that it had never been once regulated, or the regulating-screw touched since I bought it; and during this time it has been exposed to some very severe usage, having been six times taken across the Atlantic, and having undergone great variations of climate, and some thousands of miles of land travel. I may add that I have found it extremely accurate in measuring heights, and though it has twice been taken from 500 to 700 feet higher than the altitude (9,000 feet) for which it is graduated, its accuracy has remained unimpaired.

Very truly yours,

G. PEABODY RUSSELL.

POCKET-SIZE ANEROID BAROMETERS.

These instruments are called Pocket Aneroids, from their convenient size. They are between the 5-inch and the Watch Aneroid—outside diameter of dial about 2½ inches, depth of case, 1¼ inch. They are recommended where extreme portability is not so much a consideration, for the diameter of the dial being greater the divisions on the scale are more open, and therefore more readily seen. Owing also to the increased size of case a larger vacuum box can be employed.

No. 21. **Pocket-Size Aneroid Barometer** of superior construction, with compensated movement and revolving or fixed Altitude Scale of feet ranging from 6,000 or 10,000 feet according to requirement, in case £3 15 0

No. 22. Ditto, ditto, to 12,000 feet 4 4 0

No. 23. **The Indian Government Pattern Aneroid Barometer**, with compensated movement of best construction, silvered metal dial and revolving Altitude Scale to 15,000 feet, in pocket case ... 4 15 0

No. 24. Ditto, in solid leather case 4 18 6

No. 25. Ditto, to 20,000 feet 5 10 0

No. 26. **The Geographical Society's Aneroid Barometer**, 2½-in. diameter, engraved dial, revolving Altitude Scale to 10,000 feet, with stem setting adjustment by the bow. Extra thin and rounded nickel-plated case, compensated movement £5 15 0

Aneroid Barometers for Ballooning, with registering index, to any altitude scale required.

METRIC SCALE.

Instruments with Metric Scale can be supplied with the equivalent in metres of the number of feet specified for each instrument, for instance, 3,000 metres instead of 10,000 feet at same price.

POCKET COMBINED ANEROID BAROMETER, COMPASS, AND THERMOMETER.

No. 27. **Pocket Combined Barometer**, aneroid movement, compensated for temperature, with Altitude Scale up to 8,000 or 10,000 feet, and silvered scale circular thermometer at back, with a Singer's Patent Day and Night Compass with stop, in the centre. Complete in reversible snap case, so that either the Barometer or Compass and Thermometer may be used without removing the instrument from its case ... ... price £5 15 0

No. 28. Ditto, up to 14,000 feet (or 16,000 feet) 6 6 0

No. 28A. Ditto, 20,000 feet 7 7 0

ANEROID BAROMETERS

FOR SURVEYING.

J. H. S. has given particular attention to these forms of Aneroid Barometers, and having added many improvements from time to time, with a view to make them as perfect as possible, he can confidently recommend his surveying Aneroids as instruments of accuracy and efficiency.

The Aneroid Barometer is now largely used by Surveyors and Engineers in taking preliminary surveys of tracts of country and railways and by military men in contouring, &c. The differences in level noted being often very slight, the movements of the instrument have to be very carefully made and adjusted so as to respond readily to very slight changes of atmospheric pressure. The altitude scales are divided with great care, so as to eliminate any errors arising from imperfect graduation. The computation of the altitude scales is made from the most approved formula, and the mean air temperature usually selected is that of 50° Faht. This temperature is best suited for the British Isles, and for countries in the temperate latitudes. But in tropical countries, where the temperature differs considerably from this, a small correction can be made (*see page* 38), or altitude scales can be graduated to correspond to the mean air temperature of the place, and this should be specified at the time the instrument is requisitioned. For determining in the field the altitudes for any temperature whatever, the aneroid designed by Mr. John Blakesley is most efficient. Compensation for difference of air temperature is made by a movement of the zero of the altitude scale a definite amount, and the true height for the given temperature is at once obtained.

The altitude scales of the surveying Aneroids are very clearly divided, the fineness of the divisions depending on the range of the scale employed. The divisions may correspond to either 5 ft., 10 ft., or 20 ft., and intermediate points are determined by ocular interpolation. When accuracy is required in estimating the intermediate points, a Vernier attachment to the altitude scale is used with advantage. This

J. H. STEWARD, 406, 457, STRAND, W.C.; 7, GRACECHURCH STREET, E.C., LONDON.

entails mechanism of a particular construction, the pressure scale of the Aneroid being a gradually increasing one, and the height scale being regular at all points. By means of the Vernier Aneroid (fig. 52, p 43) difference in level can be determined, according to the scale used, from 1 ft. to 5 ft. up to 20,000 ft.

A new form of Aneroid (fig. 53) has been devised which will enable small variations of level to be determined at great altitudes without the use of a vernier. The outer diameter of the dial is divided to 2,000 ft., and openly divided to every 5 ft., so that smaller levels can be easily estimated. A small dial and hand indicates the atmospheric pressure and the approximate height above sea level to 10,000 ft., each 2,000 ft. of ascent or descent being measured to within 5 ft. by the supplemental indicator (large hand) at the different points above sea level, this height indicator making five revolutions to one of the barometer hand (*see page* 44).

DIRECTIONS FOR SETTING ANEROID BAROMETERS.

Periodically an Aneroid Barometer should be compared with a first-class Fitzroy Mercurial Barometer or a Standard Mercurial, and the difference in reading noted. It should be set by turning the screw at the back. This screw must not be touched for any other purpose, and the idea of setting for sea level is an illusion, for the Barometer is always varying at sea level as well as other positions, so that all the setting can do is to make it agree with a Standard, or any instrument it is desired to compare it with. For exactitude of comparison, allowance has to be made for temperature of The Mercurial Barometer when setting a compensated Aneroid Barometer.

CORRECTION FOR AIR TEMPERATURE.

Correction to be applied to the Altitude Scale of Aneroid Barometers for **Mean Air Temperature** above or below 50° Faht.

Add to observed height 2 per cent. for every 10° *ABOVE* 50°.

Deduct 2 per cent. for every 10° *BELOW* 50° Faht.

J. H. STEWARD, 406, 457, STRAND, W.C.; 7, GRACECHURCH STREET, E.C., LONDON.

WATCH SIZE SURVEYING ANEROID BAROMETER.

Fig. 50.—Surveying Aneroid, £3 10 0

No. 16. Steward's Improved Surveying Aneroid Barometer, with Revolving Altitude Scale, 4,000 feet up and 1,000 feet down, reading to 10 feet, Zero at 30. The divisions are so arranged that they are readily seen, long and short lines giving the 20 and 10 feet intervals respectively. The movement is compensated and of best quality, fig. 50 ... ... £3 10 0

N.B.—This is the same description of Aneroid as the No. 5 pocket size, fully described at page 40 and is also a very useful one as a weather glass, on account of the open range.

No. 17. Open Range Fixed Scale Aneroid Barometer, finely divided to show every 10 feet up to 4,000 feet, having a Magnifying Lens cemented on to the glass over the index which revolves with it, thus ensuring an accurate reading. A splendid instrument for small elevations, in pocket case £3 15 0

Testimonial referring to Watch Size 4,000 feet Aneroid, divided to 10 feet. No. 17.

From LIEUT. COLONEL WILLOUGHBY VERNER.

Mr. Steward, Shorncliffe, August 24th, 1892.

I used one of your 2-inch Aneroids, fixed scale 4,000 feet graduated to 10 ft., last winter in Spain, during various expeditions into the Sierra after eagles' and vultures' nests.

The greatest difference in altitude taken in one day was 2,750 feet up and down. This it did with extreme accuracy, as I proved by observations taken at about half a dozen stations during the ascent and descent. I found I could always rely on it to read within 10 feet of the true level when ascending. Before leaving Gibraltar on January 1st, I tested it up and down the Rock in company with an officer of the 60th. The height indicated at the Signal Station was midway between 1,260 and 1,270 feet, and the Bench Mark there we *subsequently* ascertained to be 1,267·2 feet.

Yours faithfully,

(Signed) WILLOUGHBY VERNER,—Major, Rifle Brigade.

No. 18 Military Surveying Watch Aneroid Barometer, (Hutchinson Model) with Revolving Altitude Scale, reading to 25 feet, 1,000 up and 1,000 down, for Military Contours and Engineering work £2 15 0

POCKET SIZE SURVEYING ANEROID BAROMETER.

No. 19. Steward's Improved Pocket Surveying Aneroid Barometer, with Revolving Altitude Scale, 4,000 up and 1,000 down, reading to 10 feet. The movement is compensated for temperature ... ... Price ... £4 4 0

This Instrument has been designed by J. H. S. to meet the requirements of Engineers, Surveyors, &c., in measuring altitudes of from 10 feet to 4,000 feet, and for use in mines. It has a very open Scale of Inches and a Revolving Altitude Scale specially arranged, so that each division represents 10 feet, and can be clearly distinguished. The hand is made long and very fine at the point, and the other parts of the Instrument are all constructed so as to insure the greatest possible accuracy. Since their introduction J. H. S. has sold a great number of these Instruments to practical Surveyors and Miners, also for Military use when contouring, and in each case with the most satisfactory result. He has also had the pleasure of supplying several for the American Government Surveys, as will be seen by the following letter:

Milwaukee, Wisconsin, U.S.A.

DEAR SIR,—Prof. E. T. Cox, State Geologist of Indiana, showed me an Aneroid Barometer of extra fine quality as to graduation, compensation, &c., which he purchased of you (price, £4 4s.) last year, and which he finds to answer the purpose of measuring altitudes with great satisfaction.

I herewith send you a draft for three such instruments, for use in the State Survey of Wisconsin.

Yours truly,

Mr. J. H. STEWARD, 406, Strand. J. A. LAPHAM, State Geologist.

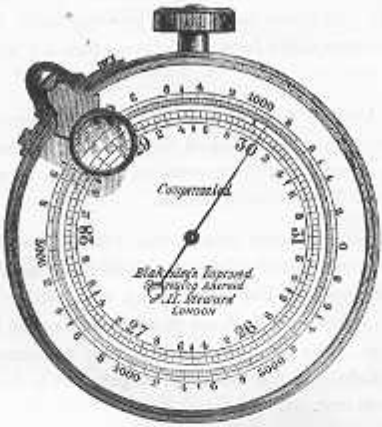
(See also Mr. Hall's letter, page 35.)

No. 20. The Sopwith Aneroid, a very compact and reliable Instrument. Diameter of Case just under 3 inches; compensated for temperature. Fixed Altitude Scale 3,000 ft. up and 1,000 down; reads to 10 ft.; Magnifier attached to glass. At the back of the case, which is made of brass, bronzed, is a Singer's Dial Day and Night Compass, 1½-inch in diameter, with stop. Around this is a reular Thermometer with a double scale. The whole fits into a Solid Leather Sling Case for Travelling ... ... Price ... £7 7 0

In this form of Instrument the Altitude Scale is engraved on a ring of metal, raised above the dial, the Barometrical Scale being on the dial; the two are thus distinct from each other, and readings can be quickly taken.

The above Instrument was designed and constructed for Mr. T. Sopwith, jun., the eminent Engineer, who found it to answer its purpose most efficiently.

BLAKESLEY'S IMPROVED SURVEYING ANEROID.



THE BLAKESLEY ANEROID

Fig. 51.—£6 15 0

The instructions for making the necessary corrections for temperature are engraved round the dial of instrument, but are not shown in the illustration above.

The Blakesley Improved Surveying Aneroid. This instrument has been made at the suggestion of Mr. John H. Blakesley, A.M.I.C.E., in order to readily make the necessary correction for the temperature of the air in the measurement of heights. By this means the efficiency of the Aneroid as an instrument for use in the field is largely increased. The measurement of heights by means of the barometer is effected by the difference in weight or pressure of a column of air at a lower level to its pressure at a higher level. Now the atmosphere being composed of gases, is susceptible to various changes, which affect both its weight and volume, and these changes have to be considered when measuring altitudes by differences of atmospheric pressure. Chief among the causes affecting the air, and which have to be taken into account in height measurement, are those due to its hygrometric condition, its diurnal variations, and, most important of all, its thermometric condition. The determination of a height by means of the barometer is equivalent to the weighing of a column of air under varying conditions. As the temperature increases, the weight of a given column of air becomes less with the same pressure. Consequently, if a height is measured with an Aneroid having an altitude scale computed for an air temperature of 50 deg. Faht., the height indicated would be correct for that temperature. But, presuming the same height to be measured when the temperature is raised to 70 deg. and using the same Altitude Scale, the height indicated will be less than the true height; because the column of air having increased in volume its weight has become less for the same elevation.

Similarly, a given column of air at sea level will weigh more than the same column of air at a height above sea level. Consequently, the Altitude Scales of Aneroid Barometers are graduated so that the arcs subtended by given heights decrease in proportion as the pressure decreases.

It will be thus noticed that the arc subtended by the pressure scale decreases for a given height as the temperature increases, and, similarly, the arc subtended by the Altitude Scale for the same height also decreases as the pressure becomes less. Without going into details, it can be mathematically demonstrated that on some portion of the Altitude Scale the arc, subtended by a given height, is found to correspond to the arc subtended by the pressure scale for the same height, should the air temperature differ from the temperature for which the height scale is computed.

The Blakesley Aneroid is so constructed that this correction can be readily effected. The pressure scale is divided on the dial and represents an exact number of inches, occupying equal arcs. The scale of feet may be graduated to suit any given temperature, with its zero at 31 inches.

If the mean air temperature is greater than that indicated on the instrument, the Altitude Scale is moved round in the same directions as the hands of a watch or towards increasing pressure. For every 16 deg. Faht. difference of air temperature the zero of the Altitude Scale is displaced to an equivalent of 1 inch of pressure, or in proportionate parts. For greater accuracy, it is recommended to add 0·5 for every 500 feet of altitude. If the mean air temperature is less, the Altitude Scale is moved in the reverse manner.

The external diameter of the barometer case is $2\frac{3}{4}$ inches. The Altitude Scale is rotated as in the ordinary Aneroid, and an index pointer is affixed to a ring working by rackwork, and revolving between the pressure and Altitude Scale. A supplementary ring, rotating outside the case carries a microscope to facilitate the reading of the divisions.

Blakesley's Improved Surveying Aneroid, with Altitude Scale, 6,000 feet, divided to read to 10 or 20 feet. Pressure Scale divided to $\frac{1}{20}$ inch. Complete in sling case of special construction, fig. 51	£6	15	0
Ditto, with Altitude Scale to 10,000 feet divided to 20 feet	7	15	0
Swing Thermometer, for ascertaining air temperature, fixed into lid of case, Fahrenheit scale	0	8	6
Aluminium Case for either of above instruments... ... ... extra	0	15	0

This Instrument can be supplied with **Metric Scale** as follows:

Blakesley's Improved Surveying Aneroid, with Altitude Scale to about 2,000 metres, divided to 5 metres, complete in sling case	£6	15	0
Ditto, to about 3,000 metres...	7	15	0
Swing Thermometer, with Centigrade scale	0	8	6
Aluminium Case for either of above instruments... ... ... extra	0	15	0

J. H. STEWARD, 406, 457, STRAND, W.C.; 7, GRACECHURCH STREET, E.C., LONDON.

VERNIER SURVEYING ANEROID.

No. 29. **Improved Vernier Surveying Aneroid**.—This Instrument has been designed to meet the requirements of Surveyors, &c., in the measurement of altitudes with extreme exactness. The Scale of feet is divided to 6,000 or 10,000 feet, and a Vernier moved by a circular rack and pinion enables the divisions to be subdivided to read to 5 feet. This obviates the necessity of estimating the number of feet, when the index points between the divisions of the Scale. In order to obtain the aid of the Vernier, both the Barometer and the Altitude Scale have to be constructed on a different principle to that of the ordinary Surveying Aneroid. The Altitude Scale, in this case, subtends equal arcs for every 1,000 feet of Altitude, and the pressure Scale is made an increasing one; *i.e.*, the lower the pressure the greater the arc. Thus the divisions between 25″ & 26″ are wider apart than those between 30″ & 31″. This system entails a great amount of labour and delicate adjustment, and necessitates the instrument being of the very best construction throughout. A supplementary ring carrying a reading microscope or magnifying lens is fitted to the Case to facilitate the reading of the divisions.

3-inch

VERNIER SURVEYING ANEROID.

For Engineering, Military and other work.

READING TO

EVERY 5 FEET OF ALTITUDE

TO 8,000 or 10,000 FEET.

Specially constructed as described above so that each 1,000 feet are the same length on the dial, and the scale of inches increasing in length instead of decreasing as usual. The works are compensated and of finest quality, fitted in special Solid Leather Sling Case (fig. 52) ... Price £7 15 0

Vernier Aneroid, as above, mounted in Aluminium, saving about one-half the weight 8 15 0

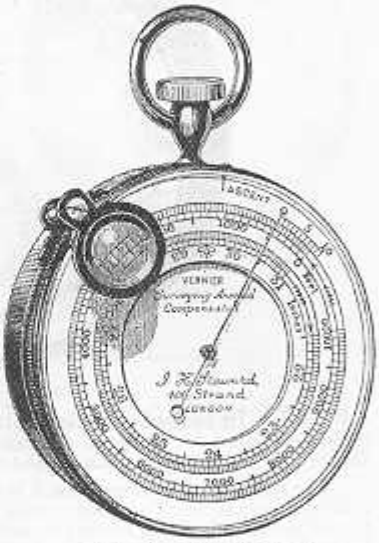


Fig. 52.—Price £7 15 0

TESTIMONIAL.

Atlanta.

Dear Sir,

I am sending you a draft for another Vernier Aneroid and a Labbez Telemetre with Telescopic power. I like the instruments very much. The Aneroid is the best I have seen.—Yours, F. W. SPENCER, A.M., Ph.D., F.G.S.

(*State Geologist of Georgia, U.S.A.*)

No. 30. **Vernier Aneroid Barometer**, with 3-inch dial engraved with divisions to show every 10 feet up to 20,000, in sling case ... £8 15 0

Ditto, in Aluminium, saving about half the weight 8 15 0

No. 31. **Improved Large Size Surveying Vernier Aneroid**, diameter of dial 5 inches, reading by means of Vernier to one foot. Scale 3,000 up, 1,000 down, in Sling Case 8 10 0

Other Scales to order.

Ditto in Aluminium 10 0 0

No. 32. **5-inch Surveying Aneroid Barometer**, with Vernier Altitude Scale to 10,000 feet to read to 5 feet, in Sling Case ... 8 10 0

Ditto in Aluminium 10 0 0

IMPROVED SUPPLEMENTAL DIAL
SURVEYING ANEROID BAROMETER.

Reading to 5 feet and by Estimation to one foot.

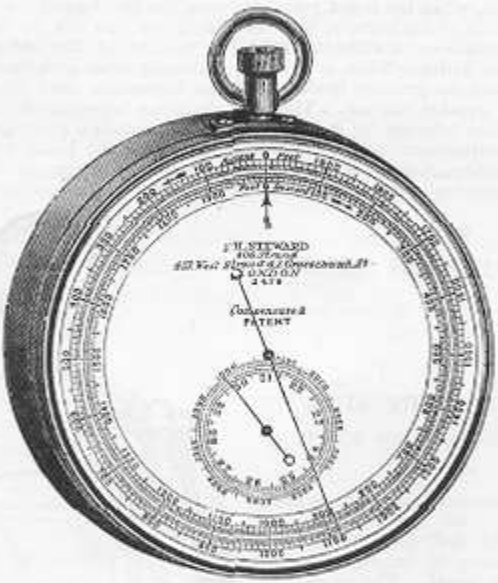


Fig. 53.—£10 10 0

No. 33. **Improved Supplemental Dial Aneroid Barometer.**—This instrument has been designed for Surveyors and Engineers who desire to get the greatest possible accuracy and finest reading from an Aneroid Barometer.

The dial is 4 inches diameter and is divided on the revolving altitude Scale to read from zero to 2,000 feet, the outside circle of divisions being for ascent with figures and lines in black, reading from right to left in divisions of five feet, while the inside Scale and figures are printed red, for descents, reading from the left to right. The revolving Altitude Scale is controlled by a rack and pinion arrangement in bow (or stem winder) which is not in action until pressed in and therefore cannot accidentally alter the reading.

The Supplemental Dial engraved on the face of ordinary dial below the centre as in the seconds dial of a watch, is 1¼ inches diameter and shows every 100 and 1,000 feet up to 10,000, also the Equivalent Barometrical pressure in inches of mercury from 31 to 21·5 inches.

On the large hand making one revolution the small hand advances the corresponding amount and so registers the extra altitude; the hundreds, tens and units of feet (by estimation) being shown by large hand on large dial.

The smallest engraved divisions are 5 feet, but as the space is very large it is easy to estimate to one or two feet.

The Case is of bronzed brass, and a Solid Leather Sling Travelling Case is provided ... ... (Fig. 53.) Price ... £10 10 0

If in Aluminium, saving about half the weight 13 13 0

TRAVELLING OR CARRIAGE ANEROIDS,

BEST QUALITY. SERIES C.

A portable Weather Glass for the use of Travellers and Yachtsmen with words rain, change, fair. Very open Scale showing the slightest change of pressure and so giving early indication of coming change of weather. Very suitable for carrying in a travelling bag or trunk. The movements are of the very best quality and are compensated for temperature. The dials are silvered metal and the cases are gilt. The prices include a Morocco Leather Snap Case.

No. 34. **Watch Size,** 2 inches diameter, compensated. Similar to fig. 50, p. 39, without the Altitude Scale £2 15 0

No. 35. **Pocket Size,** 2⅝ in. diameter, being extra sensitive and compensated 3 3 0

Case fitted with Singer's Day and Night Pearl Dial and Circular Thermometer (fig. 45, p. 32) extra 1 5 0

Either of the above can be supplied with the Metric Scale at the same price.

Fig. 54.—£2 2 0.

No. 36. **Pocket Size Aneroid Barometer for the Writing Desk and Travelling Bag,** with Scale, 26 to 31 inches, very clear division and weather words, bold hand, enamelled dial 2¾ inches diameter, and pointer turning with bezel. Bronzed rounded Metal Case (fig. 54) £2 2 0

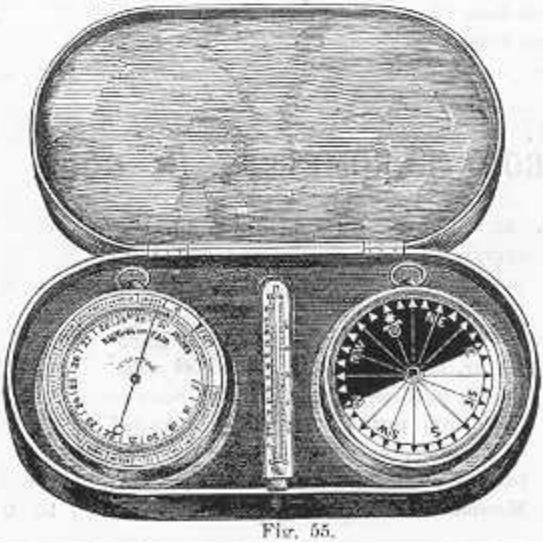


Fig. 55.

THE TRAVELLERS' COMPANION.

No. 37.

The Travellers' Companion consists of Aneroid No. 3 (p. 33), fitted in a neat flat Morocco Leather Case with a Singer's Day and Night Compass with Pearl Dial, Agate Centre and Stop, and a Thermometer with Fahrenheit and Centigrade Scales.

The Compass is the same diameter as the Aneroid, and the Thermometer is mounted between the two, forming three separate instruments in a case. Price, complete (fig. 55), £5 5 0

WATCH ANEROID BAROMETERS.

Series D.—From £1 1 0 to £2 15 0.

Fig. 56

These are thoroughly reliable as weather instruments in indicating the varying pressure of the atmosphere, also useful for Altitudes up to 12,000 feet. Where extremes of temperature are likely to occur, J. H. S. recommends those described at pages 33 to 34.

No. 38. **Watch Aneroid Barometer,** Engraved Silver Metal Dial, with words Fair, Change, Rain, Stormy, and Very Dry ... £1 1 0

No. 39. Ditto ditto ditto Revolving Altitude Scale to 8,000 feet 1 5 0

No. 40. Ditto ditto ditto ditto to 10,000 feet, fig. 56 ... 1 15 0

No. 41. Ditto ditto ditto ditto to 12,000 feet 2 2 0

Extra for **Compass with Singer's Dial** fitted into the lid of Morocco Case, also Ivory Scale Thermometer (suitable for either of the above) ... £0 12 6

No. 42. **Combined Watch Aneroid Barometer, Compass and Thermometer,** consisting of Aneroid Barometer, with engraved and silvered Dial, words Rain, Change, Fair, and revolving Altitude Scale, 8,000 feet up, and 1,000 down, Compass and Circular Thermometer at back, in case 2 15 0

CHARM ANEROID BAROMETERS IN GOLD.

Fig. 57.—£4 4 0 Charm Aneroid.

No. 43. **Charm Aneroid in Gold,** with engraved dial for weather and giving approximate indication of heights, fig. 57 ... £4 4 0

No. 44. **Miniature Watch Aneroid Barometer,** in 18-carat Gold Case. Size about 1¼-inch in diameter, with Altitude Scale to 7,000 feet, perfectly reliable; constructed on the same principle as the larger Aneroids, but with an extra fine chain. Compensated Movement. Strongly recommended ... 7 10 0

MAGNIFIER AND COMPASS.

FOR USE WITH ANEROID BAROMETERS, &c.

Fig. 58.

This Compass and Magnifier is most suitable for a traveller, for it not only enables him to get directions and bearings, but is a capital Magnifier for reading fine divisions on the scales of Barometers when taking daily observations or measuring altitudes. It is also useful for Naturalists.

The Lenses are formed of two Plano-Convex Crystals (Brazilian quartz), optically worked true, and are very strong. The needle is poised between them, and can be used in positions (such as on horseback) where an ordinary Compass cannot be satisfactorily employed. The mounting is either Silver or Gold.

PRICES.

1st Size.—**Crystal Compass and Magnifier**, 1-in. diameter Brazilian Quartz Lenses, $1\frac{7}{16}$in. over all, with belchered band, bow, and pendant of Silver, fig. 58 ... ... £1 5 0

2nd Size. Ditto ditto $1\frac{1}{2}$-ins. diameter, as supplied by J. H. S. to the Officers of the 7th Hussars 1 15 0

1st Size in 10-ct. Gold, with Brazilian Quartz Lenses as above, fig. 58 2 2 0

2nd Size in 15-ct. Gold, $1\frac{1}{2}$-inches diameter 2 15 0

IMMISCH'S PATENT METALLIC THERMOMETER.

This Pocket Thermometer is very sensitive and accurate, and is most convenient for a traveller, as the size (shown in figure) permits of its being worn on the end of a double watch chain, and carried in the waistcoat pocket with convenience. Silvered dial. Scale 30° to 110° £0 18 6

Kew Verification of same 0 2 6

Immisch's (Avitreous) Metallic Clinical Thermometer, divided 90° to 110°, same size and form as figure, Nickel-plated Case, and Metal Protection Cover for the pocket £0 18 6

Kew Verification for ditto, tested at every 5 degrees 0 2 0

18s. 6d.

* STANDARD METEOROLOGICAL OUTFITS
FOR BOARD OF HEALTH OR PRIVATE OBSERVATIONS.

No. 1. * The Eleven Guinea "Collegiate" Meteorological Set.

		£	s.	d.
Standard Barometer, as described, fig. 1, page 8		4	15	0
Standard Thermometers, Maximum, fig. 74, page 58		0	12	0
Do. do. Minimum, fig. 75, page 58		0	10	0
Do. do. Wet and Dry Bulb, fig. 85, page 62 ...		1	5	0
Stevenson's Cage, page 57		2	2	0
Copper Rain Gauge, fig. 121, page 71		1	1	0
Verification of Instruments, page 69		1	7	0
With Packing Case for Barometer and Instruments, £11 11s.		11	12	0

This is the Minimum Equipment for Meteorological Observations acknowledged by the **Royal Meteorological Society.**

No. 2. * The Twenty-One Guinea Meteorological Set.

	£	s.	d.
Standard Barometer, fig. 1, pages 7 & 8	8	8	0
Plate Glass Case for ditto	3	5	0
Pair of Standard, Maximum and Minimum Thermometer, with Verifications, page 58	2	2	0
Hygrometer (Wet and Dry Bulb), fig. 85, page 62	2	2	0
Solar Radiation Thermometer with Stand, fig. 76, page 59	1	18	0
Stevenson's Cage, page 57	2	2	0
Copper Rain Gauge, fig. 121, page 71	1	1	0
Verification of Barometer, Hygrometer, Rain Gauge, &c.	1	14	6
Complete in Packing Case, **£22 1s.**	22	12	6

No. 3. * The £33 Meteorological Set.

	£	s.	d.
Standard Barometer (Fortins'), with English and Metric Readings, fig. 3, pages 7 & 8	10	10	0
Glass Case for ditto	3	5	0
Standard Thermometer, Maximum, fig. 73, page 58	1	1	0
Do. do. Solar Radiation, with Stand, fig. 76, page 59	1	18	0
Do. do. Minimum, fig. 72, page 58	1	1	0
Do. do. Grass do., fig. 77, page 58	1	1	0
Do. do. Hygrometer (Wet & Dry Bulbs), fig. 85, p. 62	2	2	0
Stevenson's Thermometer Screen, page 57	2	2	0
Copper Rain Gauge, fig. 121, page 71	1	1	0
Jordan's Sunshine Recorder and Set of Charts, fig. 119, page 70 ...	3	8	6
Anemometer, fig. 125, page 73	3	10	0
Verification of Barometer, Thermometers, Anemometer, and Rain Gauge, page 69	2	11	6
	33	11	0

The Set Complete, **£33**

(Estimates given for Larger or more Complete Sets.)

J. H. STEWARD, 406, 457, STRAND, W.C.; 7, GRACECHURCH STREET, E.C., LONDON.

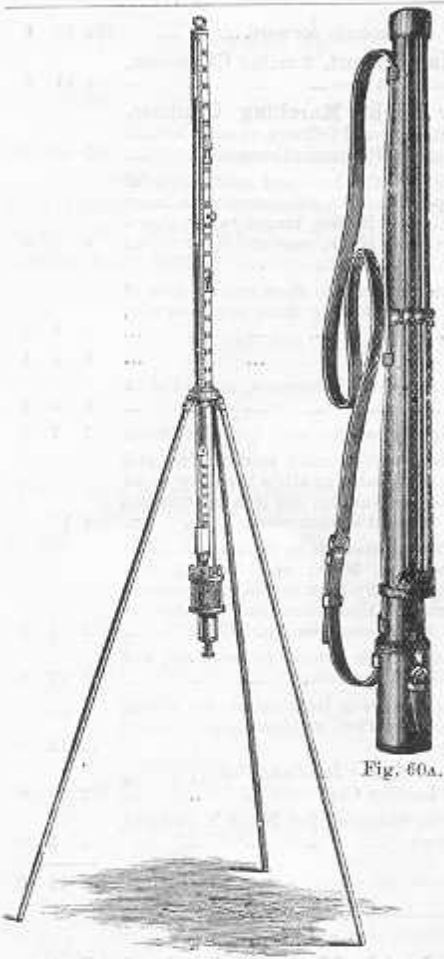


Fig. 60.

Fig. 60a.

EXPLORER'S OUTFIT.

*Standard Mercurial Mountain Barometer. For special observations of a Standard character, the Mercurial Barometer is still used, and the one illustrated is practical and reliable. It is on the Fortin principle, same as Standard, fig. 3, pages 7 & 8, but is fitted with Tripod Stand and Sling Case. The Scale is divided to English and Metric Measure, and reads by Vernier.

Price Complete (figs. 60 & 60A), £10 10 0

Kew Verification, if required, 15/6 extra.

Simpler forms, without Stand, from £5 5 0

The Hypsometer or Boiling Point Thermometer, with strong telescopic tube casing for Thermometer, and Spirit Lamp, &c., for heating water The Thermometer is packed in Metal Case, lined with India rubber, and the whole fits into a Solid Leather sling Case. £4 15 0

Extra Thermometer, packed in brass tube £1 5 0

For ordinary Observation by Explorers and Travellers, the Aneroid Barometer is generally considered sufficient for all practical purposes, and if two are taken to check each other, excellent results are obtained.

Those recommended are the—

Vernier Surveying Aneroid Barometer, fig. 52, page 43 .... £8 8 0

and

Pocket Size Aneroid, 12,000 to 20,000 feet, according to the Maximum height likely to be explored, see No. 23, page 36 ... say 4 18 6

Portable Rain Gauge, 3-inch Surface & Measure, in leather sling case 1 15 0

Livingstone's Pocket Maximum and Minimum Thermometer, see fig. 91, page 63 ... ... Verified 2 10 0

Swing Thermometer, for air temperatures, engine divided, packed in Metal Case lined with rubber 0 10 6

Pocket Hygrometer, Wet and Dry Bulb Thermometers, Verified 2 7 0

Carried over ... £36 19 0

Brought forward	£36 19 0
Verner's Complete Sketching Instrument, forming Clinometer, Compass, Sight Vane and Protractor, in case	1 11 6
Verner's Traveller's Forest or Night Marching Compass, as supplied largely to Staff and Regimental Officers, in solid leather case. It also answers the purpose of a Prismatic Compass	2 3 0
Field Glasses. "The Duke Binocular," the best and most powerful glass made, gives a magnifying power of Six Diameters with large field of view, diameter of objectives, 2 inches, length when closed 5½ ins. Price in solid leather, brown or black, case and sling ... Aluminium, half the weight £10	6 6 0
Current Meter, for use in Rivers and Streams, to show rate of flow of tide, or the number of gallons of water flowing from any reservoir, or fluid from a large vessel	5 5 0
Ozone Cage, in Copper	0 15 6
Ozone Test Papers, prepared from Dr. Moffat's formula, and set of 10 Comparative Tints...	0 10 6
Nautical Sextant, of best make with Telescopes and Kew Certificate	7 7 0
Artificial Horizon, of portable form with parallel worked glass and Mercurial Compartment below, with valve to allow mercury to be in use or safely carried in it when travelling, for it is so arranged that it cannot be spilled.—Price, in solid leather case	4 10 0
Chronograph Watch, showing fifths of seconds on the outer edge of the ordinary dial, and minutes up to 30 on small dial, keyless movement, and stopping, starting, and fly-back action, by touching Stem Winder for the Chronograph. The hours and minutes are shown as in an ordinary watch. Silver case (see fig. 127, p. 74) ...	5 5 0
Improved Abney Level, with new screw motion to large arc, and long easy reading Vernier, in solid leather case	2 17 6
The Omni Telemeter, or portable Surveying Instrument, for giving distances of objects and heights. A perfect mathematically correct instrument, in solid leather sling case	12 12 0
Tripod Stand for ditto, with Ball and Socket Joint and Clamp, having horizontal and vertical motions, Leather Cap	2 16 0
Universal Sundial, with reversible Gnomon, for N. or S. latitude, in case, levels and adjusting screws	3 3 0
	£91 15 0

Farmers' and Household Meteorological Sets.

* THE FARMER'S FIVE GUINEA SET.

Fitzroy Barometer, with Square top Oak Frame, and double Verniers reading to 100th inch, fig. 11, page 13	£2 10 0
Maximum and Minimum Six's Thermometer, fig. 67, page 54 ...	0 17 6
Hygrometer, in Tin Case, Porcelain Scales, fig. 84, page 62	1 1 0
Copper Rain Gauge, fig. 121, page 71	1 1 0
	£5 9 6

The Set Complete £5 5 0

*THE COUNTRY HOUSE "TEN GUINEA" SET.

Barometer in Large Size Oak Frame, with bold column of mercury (fig. 6, page 12) £4 15 0

Pair of Standard Maximum and Minimum Thermometers, with verification (page 58) 2 2 0

Hygrometer, enamelled scale, with verifications (fig. 84, page 62) ... 1 1 0

Stevenson's Cage (page 57) 2 2 0

Copper Rain Gauge (fig. 121, page 71) 1 1 0

£11 1 0

The Set complete, £10 10 0.

TRAVELLER'S OUTFIT.

Watch Size Aneroid Barometer, with altitude scale, according to likely height required, say 13,000 ft. £3 15 0

Maximum and Minimum Thermometers. Livingstone pattern. The tubes are engine divided, metal engraved scales, and boxwood backing, with folding plates to hang each separately, fitted in neat polished mahogany case, with snap catch, and lined with velvet. Size 10¼-in. long, 2⅜-in. wide, ⅝-in. deep, with Kew verifications (fig. 91, page 63) 2 10 0

Pocket Hygrometers. Consisting of wet and dry bulb thermometers, engine divided on the stem, fitted to metal plate backing, with silvered scales, pillar support and feet to unscrew and pack in flat case, 7½-in. long, 3½-in. wide, and 1½-in. deep, with verification ... 2 10 0

Swing Thermometer, packed in metal case 0 10 6

Improved Abney Level, with telescopic tube sight, silvered mirror, and spirit bubble, moved by means of an endless screw, and reading to minutes of angle by long Vernier on a large arc, in solid leather case with sling 2 17 6

The Steward Telemeter, for measuring distances from a small base without calculations, with case 5 5 0

Verner's Complete Sketching Instrument. Consisting of small compass, with revolving meridian and degrees, folding down sights for alignment, Clinometer plumb bob with automatic stop, all mounted on a protractor having useful scales, and formula on back and front, in solid leather flat pocket case, size 5½ × 3-ins. 1 11 6

Box Sextant of best make, with telescope 5 5 0

The United Service Binocular Field Glass, with large field of view and good power, in solid leather case 3 10 0

Rain Gauge, portable form for travellers, 3-in., in solid leather case ... 1 15 0

Pocket Magnetic Compass, with luminous dial and direction line, with slit in lid and notched bow for taking directions, and for marching on any required bearing on the darkest night, and for use in place of prismatic compass, in solid leather case 2 3 0

Total £31 12 6

THERMOMETERS.

The Thermometer is an instrument used in Meteorology for determining the temperature of the air.

It consists of a glass tube with a bulb blown at one end, the other end being hermetically sealed. It is usually filled with either alcohol or mercury.

Mercurial Thermometers are for most purposes preferable, owing to their extreme sensibility, and to the accuracy of their indications, due to the equal expansion of the substance with varying temperatures, but for special purposes and minimum readings, the Spirit (or Alcohol) Thermometers are indispensable.

The Thermometer Scales employed are those of Fahrenheit, Centigrade, and Reaumur. Reaumur Scales are now very seldom used. Thermometers graduated on the Fahrenheit Scale are generally used in England and America; the freezing point is indicated at 32 degrees, and the boiling point of water at 212 degrees. Centigrade Scales are more generally employed on the Continent, and for chemical and scientific experiments, the freezing point being indicated by Zero, and the boiling point by 100 degrees. This (the Metric) system of measurement lends itself more readily to easy calculation and exact results.

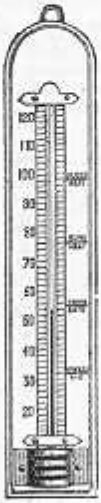


Fig. 61.
Price 1s.

Fig. 62.
Price 17s. 6d.

Fig. 63.
5s. 6d. to 25s.

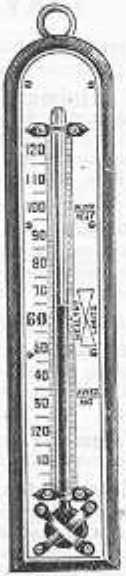


Fig. 64.
Price 3s. 6d.

Fig. 65.
3s. 6d. to 15s. 6d.

8-in. Thermometer, with boxwood scale, sunk spirit tube, fig. 61 ...	£0	1	0
Ditto, with superior bevelled boxwood scale, with sunk mercurial tube, enamelled at back...	0	2	0
6-in. Bevelled Boxwood Thermometer, with mercury tube, Faht. and Cent. scales	0	2	6
8-in. ditto, Faht. and Cent. scales	0	3	6
10-in. ditto, with bold mercury tube, Faht. and Cent. scales	0	4	6
8-in. ditto, with very bold spirit column	0	3	6
8-in. Thermometer, with white **Xylonite** scale and bold tube, fig. 64	0	3	6

Superior Boxwood Thermometer, with lens front tube magnifying the mercury column, very bold, best quality, 8 inch £0 6 6
Ditto ditto 10 inch 0 8 6

4-in. Thermometer, boxwood scale, Faht. and Cent., or Faht. and Reaumur 0 4 6

Porcelain Thermometer, with bold legible figures, 8 inch 0 5 6
Ditto fig. 63, 10 inch, 8s. 6d. ... 12 inch 0 12 6
Ditto, superior finished, with gun metal or nickel mounts, 14 inch ... 0 15 6
Ditto ... ... 16 inch, £1 5s. ... 20 inch 1 15 0

Drawing Room Thermometers. Enamelled glass or ivory scales, with gilded mounts, on ebony or boxwood backs, 6 inch 0 9 6
Ditto ... ... 8 inch, 10s. 6d. ... 10 inch 0 14 6
Ditto, porcelain scales, fitted on to gilt metal backs, with best gilt mounts, fixed to ebony backs, very choice, 6 inch 0 16 6
Ditto ditto 8 inch 0 18 6

Boxwood Pedestal Thermometers, 5s. 6d., 7s. 6d., 8s. 6d., 14s. 6d. & 1 2 6

5-in. Ivory Scale Thermometer, attached to Ebony back and inclined at an angle on a pedestal 0 12 6
Ditto, porcelain scale and gilt mount... ... ... 1 1 0

Storm Glass (chemical) and spirit thermometer, boxwood, 8-in. scale ... 0 3 6
Ditto, superior, with mercury thermometer 0 7 6

Storm Glass and Thermometer, porcelain scale, fig. 60 ... ... 0 15 6

Window Thermometers ... ... from 0 6 6
Ditto, ivory scale in revolving glass tube, 8 inch, fig. 62 ... ... 0 17 6

Incubator Thermometer, 7 inches long 0 2 6

THERMOMETERS MADE TO MATCH FURNITURE, &c.

SIX'S THERMOMETERS.

The invention of Mr. James Six, of Canterbury. This Thermometer consists of a glass tube bent into the shape of a U, with a bulb at each end. One bulb contains alcohol, and the other contains alcohol and air sealed in at a very low temperature. The bent portion of the tube is occupied by a column of mercury. On either side of the tube above the mercury a needle is inserted, serving as a registration index. These are set by means of a magnet, until they rest on the top of the column of mercury (which denotes the present temperature) on each side, one side registering the extreme cold, and the other the greatest heat during any given period. As the spirit expands with an increasing temperature, the column of mercury forming the indicator is forced round the bend, and pushes the needle up on one side, while on the contraction of the spirit with a colder temperature, the mercurial column is forced round the reverse way by the pressure of air left in the bulb, and carries the needle up on the other side to the minimum temperature. The right-hand index indicates the highest point the temperature has reached, and that on the left hand the lowest point. The divisions and figures giving the degrees are read upwards on the right side, and downwards on the left.

SELF-REGISTERING THERMOMETERS From 5s. 6d. to £3 3s.

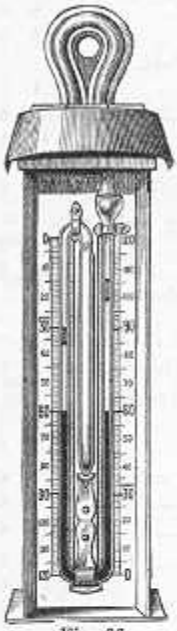


Fig. 66.
From 17s. 6d.

Fig. 67.
From 12s. 6d.

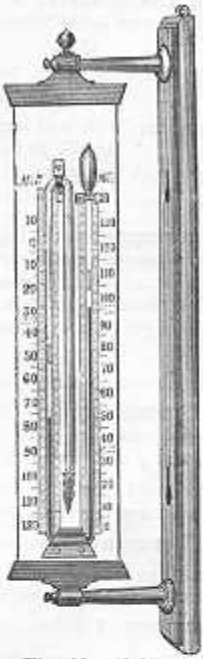


Fig. 68—£1 15s.

Fig. 69—£1 15s.

Six's Thermometer, for registering maximum and minimum temperatures, 8-inch, boxwood scale and brass loop £0 5 6
Ditto, 8 ,, ,, enamelled tube and brass loop 0 6 6
Ditto, 8 ,, ditto, plain tube in japanned tin case 0 7 6
Ditto, 8 ,, ditto, enamelled tube ,, ,, ... 0 8 6
Ditto, 10 ,, enamelled tube, fig. 67 ,, ,, ... 0 12 6
Ditto, enamelled glass scale that will not obliterate, and can always be washed, and so look fresh and clean, 8 inch 0 12 6
Ditto, 10 inch (fig. 67) 0 17 6
Ditto, 12 ,, ... 1 5 0
Ditto, 14 ,, ... 1 10 0
Ditto, 20 ,, entire porcelain scale 2 2

Six's Thermometer, with lens fronted tube, magnifying the column and indices, very bold, 8 inch box scale... ... ... 0 12 6
Ditto, 8 inch enamelled glass, fig. 66 ... ... 0 17 6
Ditto, 10 ,, ,, ... 1 5 0

The price in each case includes a magnet.

Bracket Six's Thermometer. Enamelled glass scale, fitted to oak board, with brackets to revolve, for fixing outside a window, and setting to required angle, for conveniently seeing temperature from inside the room ... 10 inch, fig. 68, p. 54, £1 15s.... 14 inch 2 2 0

Spitta's Thermometer, being an upright form of maximum and minimum, with supplemental bend to tube which goes behind the scale, and is filled with mercury, enamelled glass scale, oak frame, very reliable, fig. 69 ... ... 1 15 0
Ditto, ditto, engine divided on stem 2 10 0

Spitta's Bracket Thermometer, self-registering, vertical tubes, engine divided on the stem, enamelled glass scale and oak mount and board 3 3 0
If verified at Kew ... ... extra 0 10 6

SELF-RECORDING THERMOMETER.

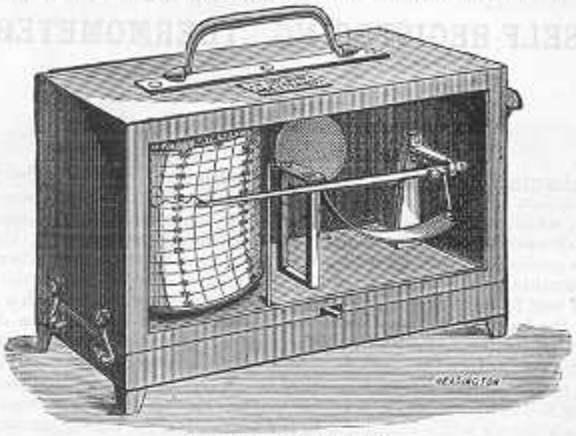


Fig. 70.—**£6 16 6**

*IMPROVED SELF-RECORDING THERMOMETER.

The registering part of the instrument is similar to that used in the Recording Barometer, the drum carrying a weekly chart and revolving once in seven days by means of the clockwork inside. The temperature acts upon a metallic thermometer, composed of a bent tube in metal, on the Bourdon system. The expansion and contraction of the metal causes the lever to move up and down, and when the pen is brought in contact with the chart a continuous line is made. It is thus possible to see the exact hour at which the lowest or highest temperature occurred, the scale being from 0° to 110° Fabt. The adjustments made at the time of constructing the instrument are such as to be permanent as regards the movements, and the only possible error is that of the displacement of the zero, and this is easily corrected by raising more or less the fixed end of the tube by means of a key and screw. The great area acted upon by the temperature makes the instrument very sensitive.

Price **£6 16s. 6d.**, complete with set of charts.

These Registering Thermometers are now only supplied with the bulb outside (having protection guard).

For Recording Barometers, see pages 26—28.

STANDARD THERMOMETER.

WITH KEW CERTIFICATE.

Fig. 71.

Standard Thermometer, engine divided on the stem, the tube carefully calibrated, 16 inches long, figured on metal scale at side from 15 to 212 degrees Faht. (see fig. 71), in morocco case £2 2 0

Kew Certificate for ditto, compared from 32° to 212° Faht. 0 7 6

SELF-REGISTERING THERMOMETERS.

Maximum Thermometers are filled with mercury, and register in a horizontal position. There are two forms of this Thermometer, one known as Phillips's, which acts by reason of a small portion of mercury being separated from the main column by a bubble of air; as the temperature increases, the separated portion is pushed before the main column, and remains stationary when a decreasing temperature causes the rest of the mercury to recede towards the bulb. The other and best form of **Standard Maximum** consists of a tube with a constriction in it near the bulb, which renders it impossible for the index to be destroyed, as might be the case with the Phillips's form, if by violent shaking the air space was forced into the bulb. When a reduction of temperature takes place, the portion above the constriction remains, while that below recedes or goes into the bulb. After registering the temperature, it is set by gently tapping on the lower end, or swinging through the air while holding it in the hand with the bulb downward.

Minimum Thermometers. These consist of a tube filled with alcohol, in which, for registering in a horizontal position, is immersed an index. As the spirit contracts and recedes towards the bulb it carries with it the index, but as the temperature rises the spirit flows past the index, leaving it at the lowest point. The end of the index farthest from the bulb indicates the lowest temperature it has reached since last set. These Thermometers are set by sloping them, bulb uppermost, and allowing the index to run down to the end of the column of its own accord. Thermometers of this class should be occasionally examined, as the spirit is liable to condense at the upper end of the tube, and thus indicate a lower temperature than would otherwise be the case. If the Spirit separates in travelling or a portion condenses at the top, it can generally be made to join the main column by swinging vigorously through the air, holding the Thermometer firmly in the hand, bulb downwards.

Until recently, **Minimum Thermometers** have only been made to register in a horizontal position, but an improvement enables this form of Thermometer to record the lowest temperature when in a **vertical position.** The horizontal minimum is reset by holding the Thermometer bulb, end upwards, when the index falls to the end of the Spirit column. The vertical minimum is reset in the same way, a small glass plunger pushing the index into position.

STEVENSON'S CAGE.

Stevenson Cage. This Thermometer Screen or Cage consists of thoroughly ventilated double Venetian sides and front door, and a solid top, and is large enough to contain a pair of Thermometers (maximum and minimum), as well as Hygrometer (wet and dry bulb Thermometers). The construction prevents the sun's rays entering the interior, while a constant current of air passes through it, and so the correct temperature is registered. Four short legs are fitted to the base so that any carpenter can raise it on a support or post to the requisite height (4 feet above the ground) ... Price £2 2 0

If with legs 4 feet 6 inches long, &c. 2 10 0

STANDARD MAXIMUM AND MINIMUM THERMOMETERS.

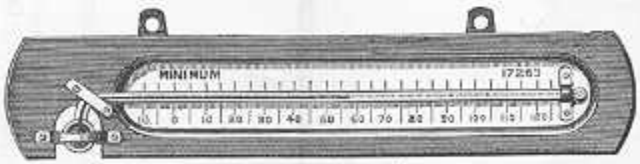


Fig. 72.—£1 1 0.

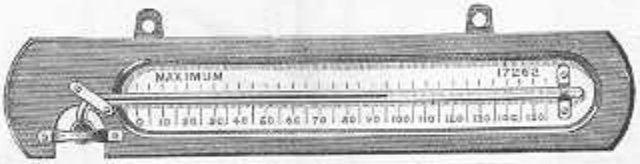


Fig. 73.—£1 1 0.

Standard Maximum Thermometer, of superior construction, fig. 73, divided on Stem and Constriction in tube to show maximum ... £1 1 0

Standard Minimum (Rutherford's), fig. 72, to match the above ... 1 1 0

Verifications of the above, 2s. 6d. each 0 5 0

Standard Maximum Thermometer, engine divided on stem, and arranged with Constriction in the tube near the bulb. 10-inch Enamelled Glass Scale, mounted on Polished Oak, like fig. 74, and Kew Verification 1 1 0

Standard Minimum (Rutherford's), do. to match, like fig. 75, with Verification 1 1 0

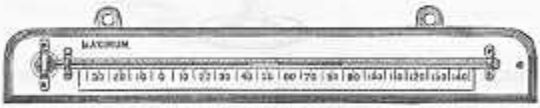


Fig. 74.—Standard Maximum, Price 12s. 6d.

Fig. 75.—Standard Minimum, Price 10s. 6d.

Standard Maximum Thermometer (Phillip's), with Air Space in Column, 8-in. porcelain Scale on Oak, Tube divided on Stem, fig. 74 0 12 6

Standard Minimum Thermometer (Rutherford's), with Needle in Tube, divided on Stem, and porcelain Scale mounted on Oak board to match the Maximum, fig. 75 ... ... 0 10 6

The above pair Verified at Kew, £1 8 0.

SOLAR RADIATION & GRASS MINIMUM THERMOMETERS.

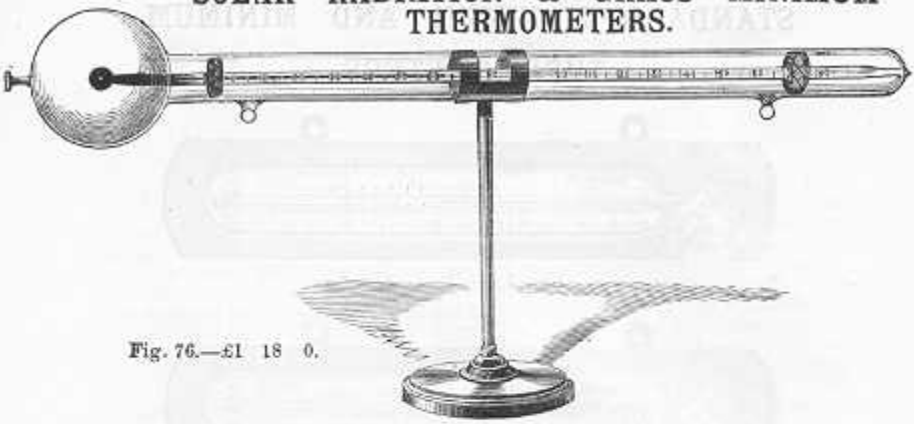


Fig. 76.—£1 18 0.

Solar Radiation Thermometer, in Vacuo, with Electrical Test on brass stand £1 18 0

Vacuum Radiation Thermometer, bright bulb, without stand .. 1 5 0

Ditto do. black bulb, ordinary pattern, without stand 1 5 0

Regulation Stand for above, for comparison, as recommended by Meteorological Society 0 9 6

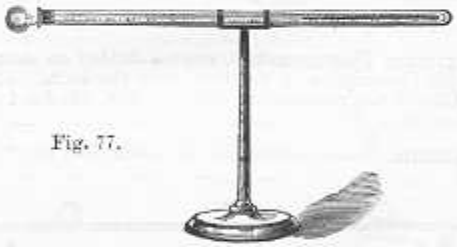


Fig. 77.

Grass Minimum, or Terrestial Radiation Thermometer with Circular bulb, engine divided tube mounted in protecting Glass tube, and fitted on stand, fig. 77 ... ... 0 18 6

Concave Metallic Reflector, on Stand, to use with the above ... 0 6 6

DIRECTIONS FOR USING MINIMUM THERMOMETERS.

Nearly all Spirit Minimum Thermometers have to be hung horizontally, or with the bulb slightly inclined downwards. For Standard Readings they should be placed in a "Stevenson's Cage" about four feet from the ground, when taking outside temperatures, or failing that, on the most favourable position facing Northwards, and protected from rain.

To set the floating index, turn the Thermometer bulb upwards until the needle falls to the end of the spirit, then hang it up on the nails already fixed for it. As the temperature gets lower the spirit contracts and carries the needle or index down with it, so that the end of the needle *furthest* from the bulb shows the Minimum reading since last set. To obtain the lowest temperature during the night, set the Thermometer as described *between 6 and 10 p.m.*

DIRECTIONS FOR USING MAXIMUM THERMOMETERS.

Hang them up horizontally, and when setting, gently tap the Thermometer on the hand bulb downwards, or swing it through air, bulb downwards.

THE IMPROVED UPRIGHT MINIMUM THERMOMETERS.

Fig. 78.

Fig. 79.

Fig. 80.

This thermometer can be hung up in a vertical position so as to register the lowest temperature, and also to show the present temperature. The index is suspended in the fluid, and has sufficient tension in the bore of the thermometer tube to remain where it is carried by the spirit on the temperature decreasing. The top of the index shows the extreme cold, while the spirit at any time shows present temperature. To reset the index all that has to be done is to invert the thermometer, when a glass rod inside the tube falls and pushes the index to the end of the spirit. On turning the thermometer right way up the setting rod falls to the bulb end and below the scale.

Upright Minimum Thermometer, Boxwood, 8-inch, enamelled tube divided in single degrees, as fig. 78 ... ... £0 3 6

Metal Upright Minimum Thermometer, with raised figures and degrees left bright against a painted base, and strong guard to bulb, fig. 80 ... ... 0 4 6

Upright Minimum Thermometer, 8-inch, opal glass scale, single degrees, in japanned case, fig. 79 ... ... 0 7 6

GARDEN THERMOMETERS.

Hot-bed Thermometer, £1 15s.

Hot-bed Thermometer, 18s. 6d.

Hot-bed Thermometers, 18-inch, plain mounting £0 8 6

Ditto, 12-inch, Boxwood 0 5 6

Hot-bed Thermometer, 30-inch, porcelain scale, in copper case, with brass tube 0 18 6

Hot-bed Thermometer, 39 inch, mahogany frame, tube enclosed in brass thermometer on door for air temperature 1 15 0

MINIMUM THERMOMETERS.

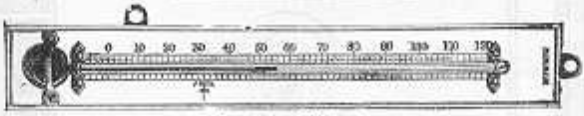


Fig. 81.—Price 1s.

8-inch Boxwood Minimum, for Self-registering lowest temperatures after setting, and for Garden or Greenhouse use, also shows present temperature, fig. 81 ... ... £0 1 0

8-inch do. do. Enamelled Tube 0 1 6

10 „ do. do. do. Scale divided to single degrees, Superior Mounts 0 2 6

10-inch do. do. do. do. 0 4 6

Fig. 82.—Price 3s. 6d.

Garden Minimum Thermometer, 10-inch painted Zinc Indelible Scale with Enamelled Tube, fig. 82 ... ... 0 3 6

Fig. 83.
Price 5s. 6d.

8-inch Minimum Thermometer Porcelain Scale, with Enamelled Tube, fig. 83 ... ... 0 5 6

10 „ do. do. do. do. 0 7 6

MAXIMUM THERMOMETERS.

8-inch Maximum Thermometer, Mercurial, for Self-registering the greatest heat after setting, with Constricted Enamelled Tube, Boxwood Scale, superior make 0 5 6

10-inch do. do. divided to single degrees ... 0 7 6

8 „ Ditto, Porcelain Scale to match Minimum, fig. 83 ... ... 0 7 6

10 „ do. 0 10 6

Symon's Earth Thermometers, for 1-ft. depth 1 1 0

Do. do. for 2-ft. „ 1 5 0

Do. do. for 4-ft. „ 1 10 0

HYGROMETERS.

Hygrometers are for ascertaining the amount of moisture in the atmosphere. The form of instrument used in this country consists of two Thermometers side by side, and so exposed that they are subjected to similar air circulation. The bulb of one Thermometer is freely exposed to the air and indicates the air temperature, whilst the bulb of the other is encased in muslin kept constantly moist by water conducted by a cotton wick immersed in a bottle of water, the latter Thermometer indicates the temperature of Evaporation. From the data furnished by each of these instruments and Glaisher's Tables of the elastic force of vapour at different temperatures, the humidity of the air can be deduced.

Another form of Hygrometer, and one in use in countries like Russia, where the air temperature is exceedingly low, is Saussure's Hair Hygrometer, based on the absorption of moisture by hygroscopic substances.

HYGROMETERS, OR WET AND DRY BULB THERMOMETERS

FOR

Showing the Humidity of the Atmosphere.

Fig. 84.—15s. 6d.

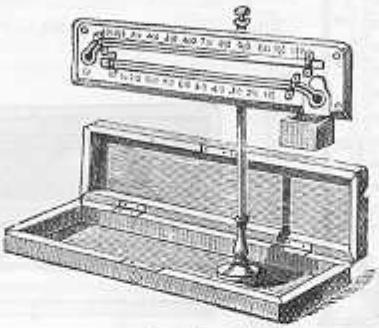


Fig. 86.—£2 2s.

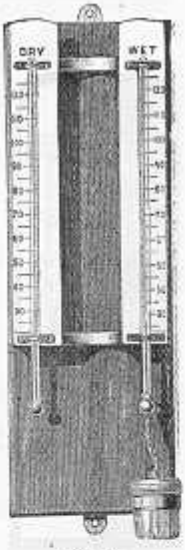


Fig. 85.
Price £1 1s. & £2 2s.

Mason's Hygrometers, for ascertaining the amount of moisture in the atmosphere, consisting of 2 Enamelled Tube Thermometers, mounted on Oak or Mahogany Board, one bulb being covered with prepared muslin, having Cotton to conduct the moisture to the Mercury from a bottle of water fixed to the side (see fig. 85), 8-in. £1 1 0

Standard Hygrometer, Engine divided on Stem, fig. 85 ... ... 1 5 0

Do. do. do. 10-inch ... 2 2 0

Kew Verifications for the above, 5s.

The Board of Trade Factory Hygrometer. Government pattern, Wet and Dry Bulb Thermometer, and engine divided on stem... 1 1 0

(Kew Verification, 5s. extra.)

The Admiralty and War Office Hygrometer, made extra strong in zinc case, with zinc wire guard for bulb and water bottle, stout enamelled scale, and engine divided tubes from 30 to 130 or 140 Faht. 1 1 0

Mason's Hygrometers, with Boxwood Scale, in japanned tin case, with water bottle 0 9 6

Do. bolder, and wider between tubes, fig. 84 ... ... 0 15 6

Mason's Hygrometer, in japanned tin case, with enamelled glass Scales, and two Thermometers of superior make, fig. 84 ... ... 1 1 0

Self-Recording Hygrometers (Wet and Dry Bulb Thermometers), with Clockwork Drum carrying a Chart to show days of the week, each day divided into hours 14 14 0

Pocket Hygrometer, fig. 86, £2 2s. With Kew Verifications ... 2 7 0

Upright Form of Pocket Hygrometer with metal pillar and brackets to support, 6-inch Scales and Tubes, and screw-off foot, in mahogany case 2 2 0

Kew Verification, 5s. extra.

Saussure's Hygrometer, with Brass Frame and Silvered Metal Scale 2 10 0

See also page 76, Horticultural Psychrometer.

POCKET AND TRAVELLING THERMOMETERS.

Fig. 87.—8s. 6d.

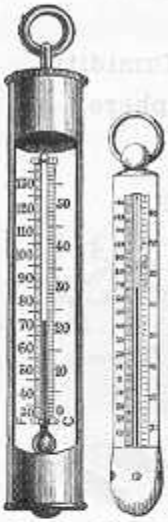


Fig. 88. Fig. 89.

Fig. 90.—£2 2s.

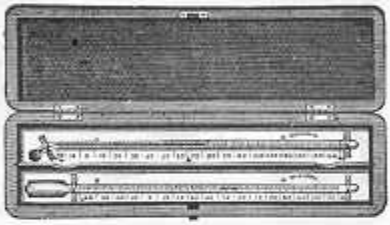


Fig. 91—£2 10s.

3-inch Boxwood Travelling Thermometer, double scale £0 3 6

Travelling Thermometer, revolving ivory scales on ebony backs, in German silver cases (fig. 88), 3 inch 0 8 6
Ditto 4 inch 0 10 6

Revolving Thermometer, in German silver case, ivory scale with ebonized mount in nickel-plated case, revolving so as to protect the tube when in the pocket, somewhat similar to fig. 88, but of bolder construction 0 16 6

Revolving Case Pocket Thermometer, superior finished, ivory scale, backed with German silver, long range, suitable for any part of the world, length 6 inches, nickel-plated 1 1 0

Solid Ivory Thermometer, 4 inch mercury tube, sunk into ivory and well protected (fig. 89) 0 8 6
Ditto, ditto, 5 inch modified shape 0 14 6

Ivory Scale Thermometers, of best quality, and snap morocco leather cases, 4 inch (fig. 87) 0 8 6
Ditto 5 inch 0 9 6
Ditto 6 inch 0 10 6

Pocket Self-registering Maximum and Minimum Thermometers, for tourists, ivory scales, in snap morocco case, 4 inches 0 16 6
Ditto, with Faht. and Cent. scales, of long range, for hot or cold countries 0 18 6
Ditto, ditto, 6 inches 1 2 6

Maximum and Minimum Pocket Travelling Thermometers, (horizontal), 6 inch ivory scales on boxwood back, engine divided on stems, in snap morocco case 1 5 0

Standard Travelling Maximum and Minimum Thermometer, metal scales, engine divided on stems, in snap mahogany case, 6½ inches long (fig. 90), with Kew verification 2 2 0
Ditto (Livingstone's pattern), 10 inches, with Kew verification (fig. 91) 2 10 0

CLINICAL THERMOMETERS, &c., &c.

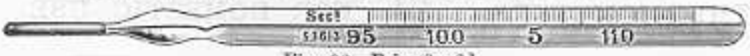


Fig. 92—Price 2s. 6d.

Self-registering Clinical Thermometer, 3½ and 4 inches, in German silver cases (fig. 92) £0 2 6

Self-registering Flat Section Clinical Thermometer 0 4 6

Fig. 93—Price 5s. 6d.

Patent Lens Front Clinical Thermometers, with indestructible and magnified index, in German silver case (see fig. 93) 0 5 6

These thermometers have the advantage of a small bulb for sensitiveness and yet at the same time show a large column of mercury, and the index cannot get out of order.

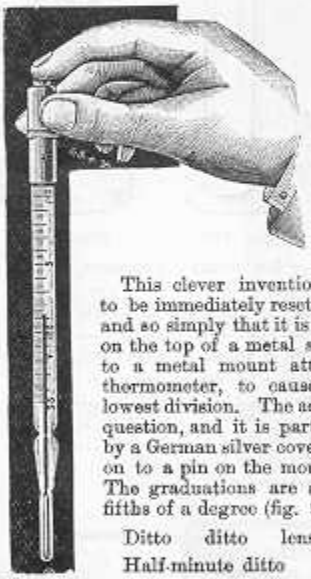


Fig. 94.

THE NEW AUTOMATIC SETTING CLINICAL THERMOMETER.

This clever invention enables a Clinical Thermometer to be immediately reset after taking a patient's temperature, and so simply that it is only necessary to place the forefinger on the top of a metal spring push piece, or plunger, fitted to a metal mount attached to the top of the graduated thermometer, to cause the mercury to recede below the lowest division. The accuracy of this thermometer is beyond question, and it is particularly sensitive. A case is formed by a German silver cover, fitting by means of a bayonet catch on to a pin on the mount referred to at top of thermometer. The graduations are as usual from 95 to 110° Faht., in fifths of a degree (fig. 94) ... ... Price £0 4 6

Ditto ditto lens fronted for magnifying the column 0 7 6

Half-minute ditto 0 9 6

Fig. 95—Price 6s. 6d.

Open Scale Clinical Thermometer, with magnified index and column of mercury, constriction near bulb giving open scale and greater strength (fig. 95) £0 6 6

Kew Verifications for above Clinical Thermometers, each 1s. 6d.

Fig. 96.

Veterinary Clinical Thermometer, in German silver case (fig. 96) £0 8 6

THERMOMETERS, FOR DOMESTIC USE.

OVEN AND MEAT THERMOMETERS.

Fig. 99.

Fig. 100.

Fig. 101.

Fig. 102.

OVEN THERMOMETER

For Pastry, 25/-

Fig. 103.

Fryometer, in brass frame. A Thermometer for cooking purposes, frying and stewing (fig. 99) £0 15 6

Meat Thermometer, in protected metal case, for inserting in joints when cooking or when cooling, engine divided (fig. 100) 0 12 6

Pastry Thermometer, in brass frame, with enamelled tube, and opal glass scales, 100° to 500° Faht. (fig. 103)... ... ... 1 5 0

Milk Tester, with opal scale, in cardboard case (fig. 101) 0 1 6

Cream Jar, divided to 20 per cent. (fig. 102) 0 1 3

Ditto, divided to 25 or 30 per cent. 0 1 6

CHEMICAL THERMOMETER.

Fig. 104.

OVEN THERMOMETER.

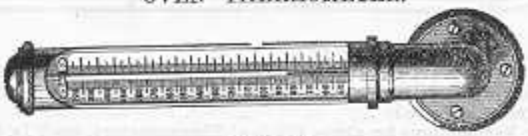


Fig. 105.

Chemical Thermometer, divided and figured on the glass tube—

0 to 220	... 8 in. to 18 in....	7/6	to 13/6
0 to 400	... 8 in. to 18 in....	8/6	to 14/6
0 to 650	... 8 in. to 18 in....	9/6	to 15/6

Chemical Thermometer, with boxwood scale, and hinged at bottom for insertion of mercury bulb in the fluid (fig. 104), 0 to 220 or 400, 12-inch, 11/6; 14-inch, 12/6 ... ... 18-inch £0 14 6
If to 650° 1/6 extra.

Oven Thermometer, for testing heat of ovens, furnaces, &c., up to 500°, tube bent about right angles, enclosed in a brass case (fig. 105) 1 5 0

Thermometers for Special Purposes made to order.

BATH AND HOUSE THERMOMETERS.

Fig. 106—5/6

Fig. 107—2/6

Fig. 108—2/-

Fig. 109.—2/6

Bath Thermometer, 8-inch metal scale (Dr. Forbes' specification), for warm, tepid, and hot baths, enamelled mercury tube, tin case, (fig. 107) £0 2 6
Bath Thermometer, to 212, plain tube, tin case (fig. 108) 0 2 0
Ditto, enamelled tube 0 2 6
Ditto, 8-inch porcelain scale, with bath words 0 5 6
Ditto, 10-inch, ditto 0 7 6
Copper-Case Bath Thermometer, with porcelain scale, 8-inch, 5/6 & 0 7 6
" " " " " 10-inch ... 0 9 6
Dairy Thermometer, 9-inch metal scale, enamelled tube, japanned case (fig. 109) 0 2 6
Ditto, ditto, porcelain scale 0 3 6
Porcelain Bath or Dairy Thermometer, with guard to bulb and enamelled tube (fig. 106) 0 5 6

BOARD OF TRADE THERMOMETERS.

Copper-Case Thermometer, riveted fittings, enamelled scale and engine divided tube, 10-inch, range from about 0 to 120 degrees ... 0 10 6
Ditto, 12-inch, with Kew verifications 0 15 6
Engine Room Thermometers .. .. from 0 2 6

BREWERS' THERMOMETERS.

Fig. 110.

Fig. 111.

Fig. 112.

Fig. 114.

Fig. 115.

Copper Case Thermometer, Porcelain or Metal Scale to 212°, best riveted copper case, magnified column of mercury; 10-in., fig. 111 £0 14 6
Ditto, 12-inch, 16s. 6d. ... ... Ditto, 14-inch 1 0 0

Patent Copper Case Thermometer, for fermenting tuns, with cup at top, that retains a portion of the liquid, which on removing the Thermometer flows down the scale and washes off the yeast, so that the temperature can be at once read off. The illustration (fig. 112) shows the cup open (before use it is pushed home against the scale), magnified column of mercury 40° to 90°. Price, 10-inch 0 16 6
Do. do. do. 12-inch, 18s. 6d. 14-inch 1 1 0

Pipe Thermometer, Porcelain or Metal Scale, 12-in. 35s. 10-in. 33s. 8-inch, fig. 110 (if with Revolving cover 5s. extra) 1 11 6

Solid Brass Tun Thermometers, Metal Scale to 212, with door to lock, fig. 114 ... ... 5-ft. £3 3s. 4-ft. £2 17s. 6d. 3-ft. 2 5 0

Improved ditto, in Solid Mahogany Frame, with Porcelain Scale and metal slide over bulb to retain the heat, fig. 115, 3-feet 2 10 0
Do. do. do. 4-ft. £2 15s. 5-ft. £3 3s. 6-ft. 3 10 0

Pyrometers of various forms. Estimates given.

SACCHAROMETERS AND HYDROMETERS.

Fig. 116.

Fig. 117.

Fig. 118.

Glass Hydrometers, Paper Scales, in Tin Cases, fig. 116	£0	2	6
" " for Fluids heavier than water, fig. 118	0	5	0
Sikes' Hydrometer of Glass, Ivory Scale, Trial Glass and Thermometer, in Polished Mahogany Box	0	16	6
Sikes' Hydrometer, Electro gilt, complete in Mahogany Box, velvet-lined, Book of Tables and Directions, Comparative Rule and Trial Glass, complete	3	0	0
Glass Saccharometers, Ivory Scale, with Trial Glass, in Mahogany Case ... ... each	0	9	6
Bates' Improved Saccharometer, in strongly gilt Metal, with four Weights and gilt Thermometer, complete in velvet-lined Mahogany Case	2	12	6
Salinometer, in gilt Metal, being a modification of the Hydrometer, to show density of water in Marine Steam Boilers, in Metal Case ...	0	10	6
Do. strongly gilt and packed in Mahogany Case	0	12	6
Do. of glass, in Metal Case, fig. 117	0	3	6
Urinometer, white enamelled Scale, and figured in black	0	5	0
Urinary Cabinet, with Trial Glass, Thermometer, Lamp, Test, &c., complete	1	12	6

CERTIFICATES OF ACCURACY.

Kew Verifications of Instruments.

The following are the charges for Verifying Instruments at the Kew Observatory, and conveying same there and fetching away :—

Standard Barometer including verification of attached Thermometer									£0	10 6
Ditto	Ditto	double Scale	...	...	...	...	...		0	12 6
Marine Barometer ...	...	...	...	...	...	...	...		0	15 6
Mountain Mercurial Barometer	...	...	...	...	..				0	12 6
Compensated Aneroid Barometer, ordinary Weather Scale							...		0	8 6
Ditto	with Mountain Scale	...	...	...	...	..			0	15 6
Ditto	with Table of Corrections for Temperature				...	...			1	2 6
Thermometer, ordinary range, divided on Stem					...	...	...		0	2 6
Ditto	Scale to 212°	...	...	...	...	...	...		0	4 6
Calibrated through the entire range of Scale				...	...	...	...		0	8 6
Hygrometer. (Two Thermometers)		...	...	...	...	...			0	5 0
Six's Thermometer, with both Scales compared at every 10°							...		0	3 6
Clinical Thermometers, compared every 5° from 95° to 110°							each		0	1 6
Boiling Point Thermometers	...	...	...	...	...	...	,,		0	4 6
Solar Radiation in Vacuo ...	...	...	...	...	...	...	,,		0	7 6
Rain Gauges ...	...	..	...	...	...	...	...	,,	0	4 6
,, **Measures**	...	...	...	...	...	...	...	,,	0	2 0
Recording Thermometer, as page 56, fig. 70				...	...	...	,,		1	10 0
Anemometers and Air Meters	...	...	...	...	..	from			0	12 6
Hydrometer. Glass compared every 10°				...	...	...	...		0	2 0
Ditto	Sykes'	ditto	...	...	...	...			0	7 0

CHARTS.

Set of 12 Meteorological Charts, to show height of Barometer and Thermometer for the month, and record wind, rain, solar max., shade max., min. wet and dry ...							per dozen	0	2 0
Set of 12 Charts in pad, with remarks and hints printed on back							...	0	2 6
A small pad of Charts, with pencil, set of 12				...	...	...	...	0	1 0
Extra large Charts, as used at the Army and Navy Club							per dozen	0	2 6
Charts.	Small Recording Barometer, set of 52 ...				...	...	...	0	5 6
Do.	Large	do.		do.	...	...	...	0	8 6
Do.	For Sunshine Recorders.		Packet of 100		...	...	...	0	5 6

BOOKS ON METEOROLOGY.

Marriott's Hints to Meteorological Observers, with Instructions for taking Observations, and Tables for their reduction ...							...	0	1 0
Abercrombies' Weather ...	...	...	...	..	...	...	...	0	5 0
Aneroid Barometer, The, and how to Buy and how to Use it						...	..	0	0 6
Glaisher's Hygrometic Tables	...	...	...	..	...	...	...	0	2 6
Scott's Instructions for the Use of Meteorological Instruments						...	...	0	2 6
Scott's Elementary Meteorology ...	...	...	...	...	...	...	...	0	5 0
Captain Toynbee's Weather Forecast ...	...	...	...	...	...	...	...	0	3 6
"The Weather Glass." Concise description of the Barometer by R. Tyas, M.A., LL.D., &c.	...	...	...	...	...	...	...	0	0 6
Companion to The Weather Glass, by ditto. Containing a Series of Charts and Tables	...	...	...	...	...	...	...	0	0 6
Glycerine Barometer, The, with illustrations, by J. B. Jordan						...	...	0	1 0
Pocket Book of Charts ...	...	...	...	...	...	...	...	0	2 6
International Cloud Atlas	...	...	...	...	...	...	...	0	15 0

SUNSHINE RECORDERS.

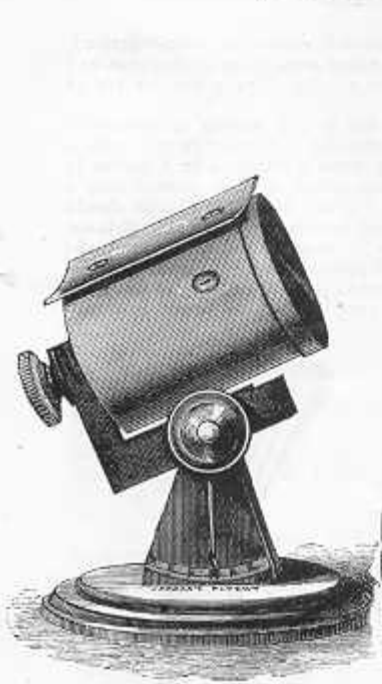


Fig. 119.—£3 3s.

Fig. 120.—£9 9s.

***Jordan's Sunshine Recorder.**—This Instrument is the result of years of experimental work by the Inventor, Mr. J. B. Jordan, and records photographically the amount of sunshine per day, and its duration. The light from the sun enters through a small aperture on the side of the cylindrical box, in which a chart is placed, and travels over the chart by reason of the Earth's Rotation. This chart is made of sensitive cyanotype paper, and is divided longitudinally into hours and fifths, so as to facilitate the record and be available for reference. All that is required to make the record permanent is to immerse the chart in cold water, with its face upwards for four minutes, and then dry between clean sheets of blotting paper. The measurements for tabulation should not be made till chart is dry. The cylinders and mounts are brass and bronzed metal. The inclination and clamp enables the instrument to be set to suit the particular latitude of observing station, fig. 119 ... ... Price £3 3 0

Set of Charts 5s. 6d.

The above is same as used by J. H. Steward for taking the OFFICIAL *Meteorological Observation at Bisley Camp, annually.*

***Jordan's Sunshine Recorder—Simple Pattern** £1 15 0

The Campbell-Stokes' Sunshine Recorder, with Glass Ball 4 inches diameter, mounted on a pedestal with frame to contain the chart which is in the focus of the Sphere, and so receives the Solar Rays, which leave a blackened path on the chart, indicating the period of sunshine. Adjustable to any latitude,
Fig. 120 ... ... £9 9 0

Set of Charts for one year £1 10s.

RAIN GAUGES.

The value and importance of records of rainfall cannot be over-estimated. The rainfall has an important bearing on our water supply, on agriculture and drainage, and carefully compiled statistics of the rainfall of any district are of considerable value in this respect.

The best form of rain gauge for general use is that known as Glaisher's pattern. It consists of a copper cylinder and circular collecting funnel with a brass rim. The diameter of the brass rim is usually either 5 or 8 inches in diameter. A copper receptacle receives the rain, which is then poured into a graduated glass measure, indicating the amount fallen. The Rain Gauge should be placed in an open position away from trees and houses, the minimum distance from the base of any object being equivalent to its height from the ground, the brass rim being perfectly level, and at least 12 inches above the ground. The rainfall should be measured at least every 24 hours to prevent loss due to evaporation. Glass receptacles are not recommended, as they are apt to break in frosty weather.

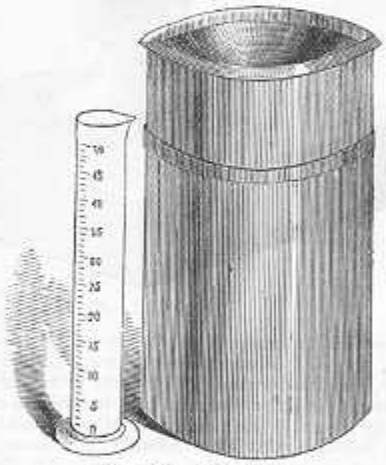


Fig. 121—Price £1, 1s.

Fig. 122—Price 10s. 6d. and 15s.

Howard's Rain Gauge, copper funnel top and glass bottle, and a divided glass measure (see fig. 122) £0 15 0
Ditto, tin funnel... ... ... 0 10 6

Glaisher's Rain Gauge, copper cylinder and funnel, 5 inch (see fig. 121), copper receiver and graduated glass measure 1 1 0
Ditto, ditto, japanned tin 0 15 0
Ditto, ditto, 8 inch, copper 1 15 0

Fitting **Snowdon Top** to the above Glaisher's Copper Rain Gauge, extra, 5 inch 0 4 0
Ditto, 8 inch 0 10 6

Traveller's Rain Gauge, 3 inch receiver, with two glass measures, in solid leather sling case 1 15 0

8-inch Snow Gauge, made in copper, with hot water compartment for melting snow, designed by the late J. Sidebottom, Esq., F.R. Met. S., including funnel to turn up and down, and graduated measure ... 7 17 6

REGISTERING DIAL RAIN GAUGE.

Fig. 123.

This Rain Gauge is designed to register any amount of rainfall from 1-200th of an inch to 25 inches automatically.

The dial is of enamelled glass and is 6 inches diameter. It is divided into two inches, one inch being one half of the dial vertically and the second inch the other half. Each inch is divided into ten parts, and these again are sub-divided into five. If 100th of an inch has fallen beyond that registered it can at once be seen on looking through the glass windows in the sides.

A small dial registers every inch up to 25—in fact, it works like some gas meters do.

It is set in motion by the rain falling into the receiver (which is 10-in. square at the opening) and flows into a tumbling bucket, which as soon as full, topples over, releases the mechanism and brings up instantaneously the other portion of the bucket to receive the rain. This goes on incessantly, and so the record is continuous, and as the registering is instantaneous, evaporation has not to be taken into account.

The frame, is strongly made of zinc so as to stand the effect of exposure to weather.

Registering Dial Rain Gauge, with receiver 10 inches square, to record up to 25 inches of rainfall. Fig. 123 ... ... £5 10 0
Ditto . ditto 8 inches square, to record up to 10 inches of rainfall 3 0 0

The Radiometer. An interesting instrument, with fans enclosed in vacuum tube, revolving by the action of light ... ...15/- to 1 10 0

RAIN BAND SPECTROSCOPE.

This pocket Spectroscope is constructed for meteorological use, as an adjunct in weather forecasting in detecting the alteration in the D or atmospheric line in the spectrum. With fixed slit, in case 1 5 0
Ditto, larger size, with adjustable slit and achromatic eye-piece, in morocco case 2 10 0

SUNDIALS.

Horizontal or Vertical Sundials supplied in any size to suit any latitude.

Pocket and Universal Sundials for travellers.
(See Catalogue, Part IV., gratis, post free.)

Current Meters and Tide Gauges of best construction.

WIND VANES.

Estimates Given for Wind Vanes, with or without Registering Apparatus, to indicate in any desired room.

BAROMETERS AND CLOCKS CLEANED AND ADJUSTED

SPECIAL INSTRUMENTS DESIGNED to suit Furniture.

ANEMOMETERS
OR
WIND GAUGES.

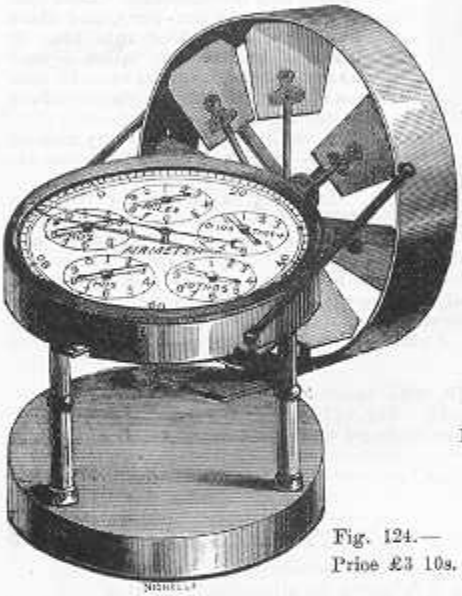


Fig. 124.—
Price £3 10s.

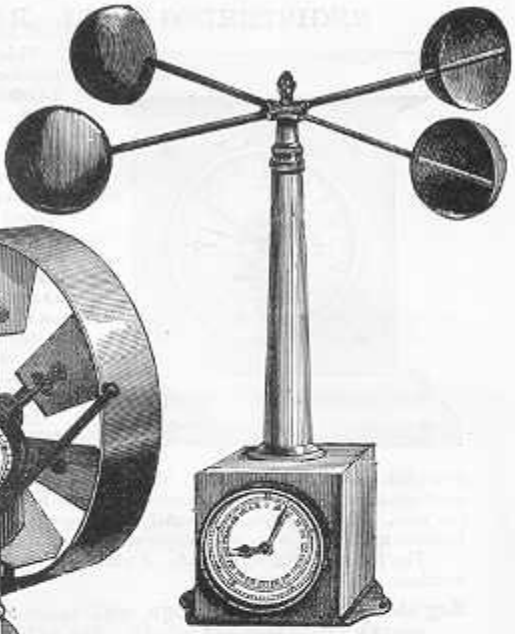


Fig. 125.—Price £3 10s.

Anemometer of small size, with six dials to show the force of the wind and velocity of air currents; also suitable for air shafts, mines, public buildings, &c. Five small dials and hands, and large dial to show units, tens, hundreds, and thousands of feet, in case, fig. 124 ... £3 10 0

4-in. Self-timing Anemometer, giving the velocity of the wind at sight, without having to time the revolutions with a watch; two circles on dial, one for showing slow velocity, from 1 to 11; and the other for high velocities, from 12 to 21, in case 4 10 0

Biram's Anemometer, for registering the velocity of currents of air in Mines, 4-inch, complete in case 2 12 6

Ditto ditto ditto 6-inches 3 3 0

Improved Educational Cup Anemometer, consisting of four Cups mounted on a convenient board to hold in the hand, and showing tenths and hundredths of a mile by means of a dial and two-minute glass, quickly put in and out of action by a trigger piece 2 2 0

Improved Robinson Cup Anemometer, with setting arrangement for bringing hands to zero, so as to avoid calculation. The mechanism is so arranged that the column carrying the Cups attached to the arms rises from the centre (see fig. 125) instead of at the side as in previous forms of this instrument. The dial records up to 500 miles 3 10 0

CHRONOGRAPHS AND CHRONOMETERS.

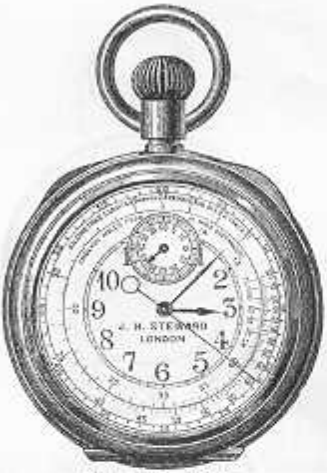


Fig. 126.—£8 8s.
Same size as Fig. 127.

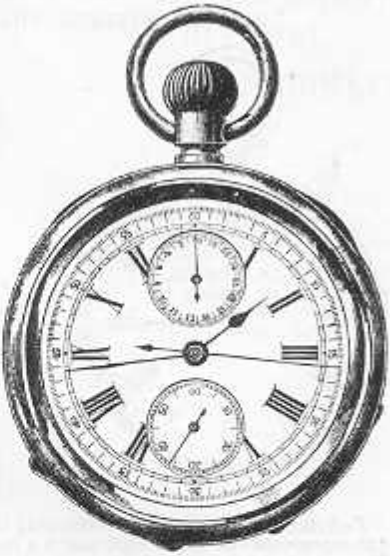


Fig. 127.—Actual Size. £4 15s.

Watch Chronograph, showing fifths of seconds and minutes up to 10, Keyless Movement, and Starting and Stopping Action, Nickel case £2 2 0

Pocket Chronograph, or Time Measure, showing fifths of a second up to 10 minutes (same as supplied to the National Artillery Association) complete in case 4 4 0

Ditto with Protecting Fitting, (same as supplied to Metropolitan Fire Brigade), in Solid Leather Case 4 15 0

Silver Chronograph, superior finish, size and form of a Watch, sterling silver cases, winds up at the stem same as a keyless watch, showing one-fifth of a second and up to 10 minutes (same as supplied to the "Field") 6 6 0

Chronograph Watch. An Improved Combined Watch and Chronograph, Lever movement, keyless action, sterling silver cases, Chronograph showing fifths of seconds around ordinary watch dial, thoroughly reliable and can be thoroughly recommended, fig. 127 5 5 0

Ditto in Bronzed Metal Cases, fig. 127 ... ... 4 15 0

Chronograph Speed Indicator, as supplied to the Westinghouse Brake Company. Shows miles per hour for ¼ mile distances; also to show kilometers per hour, and fifths of seconds; improved register and index, non-magnetic balance and works, Silver Case, Fig. 126 ... ... 8 8 0

Control Clocks. A perfect check against carelessness. A portable and accurate timekeeper. With six keys and chains 5 5 0
For full description of these see separate pamphlet.

Chronometers, for Marine use or Travellers, hung in Gymbal Case, best movements, and rated, ... from 35 0 0

Pocket Half Chronometers ... Silver from £20. Gold from 30 0 0

PEDOMETERS.

FOR REGISTERING THE DISTANCE WALKED.

Fig. 128.—15s.

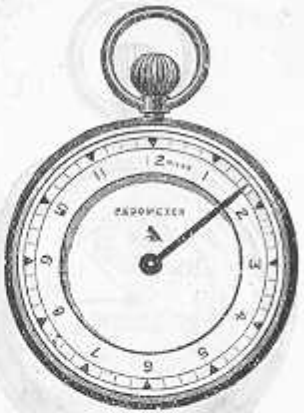


Fig. 129.—£1 5s.

Pedometer for accurately measuring the distance walked by the wearer. Fig. 128 represents the exact size, and is a front view of the Instrument. It should be suspended, either by a ribbon round the neck or by a hook in the waistcoat pocket. The figures on the dial represent miles, and the dots between the figures quarter miles. When the Pedometer is to be used, the hand should be set exactly at twelve, which can be done by moving it backwards or forwards with the finger. The instrument requires to be *regulated* to the particular person who uses it. The method of doing this is by walking a certain distance which is *known* to be correct. If the Pedometer should register a greater or lesser distance, the *regulator* at the back of the movement is to be turned with the key in the direction of either the letter F or S (fast or slow) as the case may be.

In Nickel Cases	...	...	...	...	...	...	...	...	0	15	0
Silver ditto	...	...	...	...	...	...	...	...	1	10	0

100-mile Pedometer, in Nickel Case, with the addition of a small Dial at the bottom of the ordinary one, which indicates, by self-registering every 10 miles walked up to 100 miles. Price 1 5 0

Pedometer, best quality, Silver Case 2 10 0

Ditto ditto in 18-carat Gold Cases 7 10 0

Pedometer, with Keyless Action, to set back to Zero (or 12) without opening the face. Silver Case Fig. 129 ... ... 2 15 0

Ditto Solid Gold Case ... ... from 8 8 0

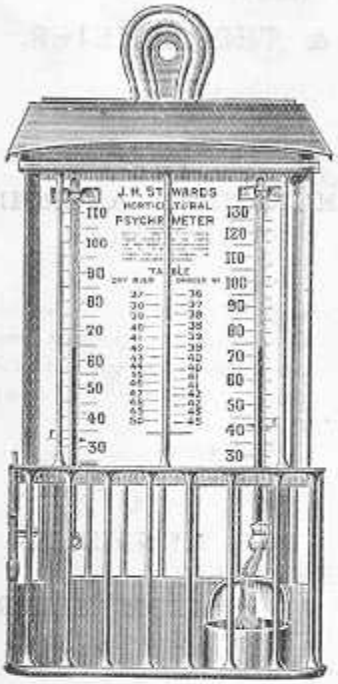
Ditto Nickel Plated 1 5 0

Passometer, or Step Counter. An instrument similar to the Pedometer, but recording the number of steps or paces taken up to 10,000. Nickel Case 1 7 6

Ditto with stop 1 15 0

TROCHEAMETER.

This Instrument is for ascertaining the distance travelled by road. It can be readily attached to the wheel of a brougham or coach, or gun-carriage by means of straps supplied with it. It works by an endless screw turning a toothed wheel, connected with a register and index. Price, complete, in Copper Case, fitted with strap... ... ... 3 3 0



J. H. STEWARD'S HORTICULTURAL PSYCHROMETER.

[REGISTERED.]

During the winter months, and more especially in the early spring, when ground frosts occur, which do so much harm to delicate plants and vegetation, the means of determining the possibility of frost occurring during the night is of inestimable value to agriculturalists and horticulturalists.

The Horticultural Psychrometer has been designed so that the dangerous temperature can be seen at a glance, and due precautions can be taken to protect the plants.

The instrument consists of a wet and dry bulb thermometer, by means of which the amount of moisture and the humidity of the atmosphere may be determined. The difference between the readings of the two thermometers also enables the temperature of the dew point to be ascertained.

The dew point temperature *at sunset* indicates the lowest temperature on the ground that could be reached during the following night.

To determine the dew point involves a slight mathematical calculation and a reference to authentic tables. In order to obviate this, a range of dangerous temperatures has been calculated and affixed to the scale of thermometers, thus enabling an observer to see at a glance whether the necessary precautions should be taken or may be safely neglected.

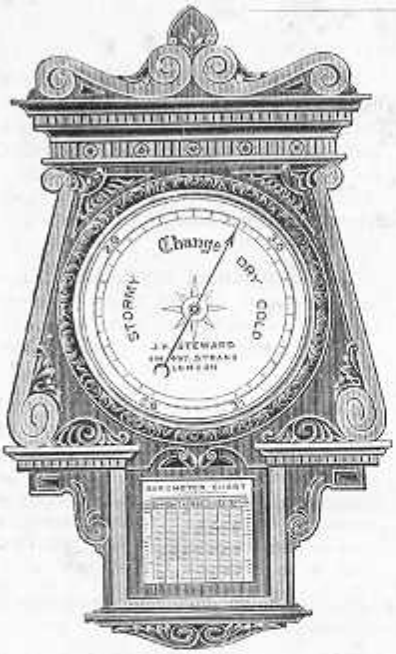
A reading of the two thermometers is taken *at sunset*, and if the reading of the wet bulb thermometer is the same or lower than the number of degrees in the danger column, opposite the dry bulb reading, the temperature on the ground can fall below freezing point, and frost occur.

Steward's Horticultural Psychrometer, or Wet and Dry Bulb Thermometer, degrees graduated on the tube and figured on the scale, and frost danger scale, as described. Porcelain scale, with figures and letters burnt in, so as to be indelible and weatherproof. Strong zinc case, with guards to thermometer bulbs and glass bottle £1 5 0

Kew Verification, 5/- extra.

J. H. STEWARD'S HIGH-CLASS ANEROID BAROMETER & THERMOMETER.

FOR PUBLIC HALLS, INSTITUTIONS, HOTELS, &c.



THE MUNICIPAL ANEROID BAROMETER.

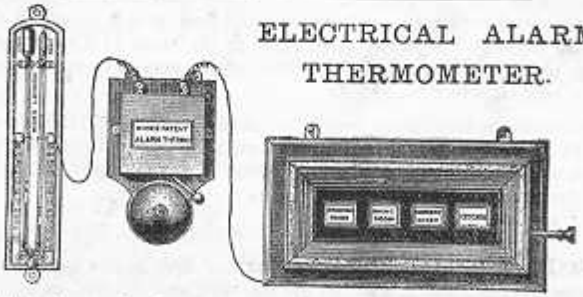
Handsome carved wood frame, containing first-class compensated movement and engraved silvered metal dial, Plateglass front, and space for weekly chart underneath.

£15 15s. 0d.

THE MUNICIPAL METALLIC THERMOMETER.

To match the above, with chart underneath the dial to register the daily temperature for a week.

£15 15s. 0d.



ELECTRICAL ALARM THERMOMETER.

For indicating a rise of temperature above its normal or ordinary degree, and of great value in warning against outbreak of fire, or dangerous increase of heat in any storing room, etc. Price, complete with bell, battery, and indicating board, with 4 discs £3 15 0

Other Alarm Thermometers supplied to suit special requirements.