PATENTS FOR INVENTIONS.

ABRIDGMENTS OF SPECIFICATIONS.

CLASS 97.

PHILOSOPHICAL INSTRUMENTS,

[*including* OPTICAL, NAUTICAL, SURVEYING, MATHEMATICAL, *and* METEOROLOGICAL INSTRUMENTS].

PERIOD—A.D. 1855-1866.

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EXPLANATORY NOTE.

The contents of this Abridgment Class may be seen from its Subject-matter Index. For further information as to the classification of the subject-matter of inventions, reference should be made to the *Abridgment-Class and Index Key*, published at the Patent Office, 25, Southampton Buildings, Chancery Lane, W.C., price 1s., postage 6*d*.

It should be borne in mind that the abridgments are merely intended to serve as guides to the Specifications, which must themselves be consulted for the details of any particular invention. Printed Specifications, price 8*d*., may be purchased at the Patent Office, or ordered by post, no additional charge being made for postage.

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Stuber, F. G. .....'61. 2790
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Thomson, R. W.....'66. 1006
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„ R. .....'56. 2163
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Wallich, G. C.....'60. 3040 '62. 3362
Wansbrough, J.....'59. 1343
Warren, F. .....'58. 1084
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Weatherdon, B. F.....'66. 1470 2068
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White, D. B.....'59. 808 '61. 1545
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Wilkie, D.....'62. 452
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Zambra, J. W. .....'55. 2306 '59. 2755. '61. 238. '62. 1223.

PHILOSOPHICAL INSTRUMENTS,

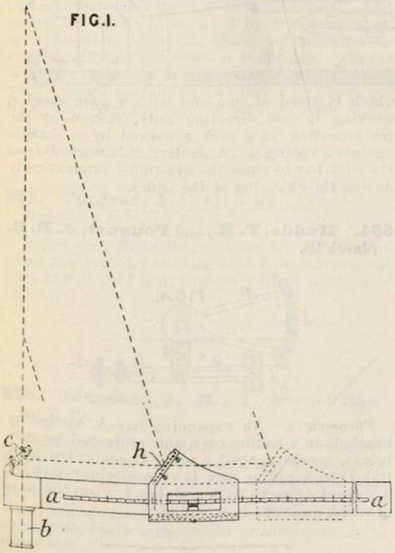
[*including* OPTICAL, NAUTICAL, SURVEYING, MATHEMATICAL, *and* METEOROLOGICAL INSTRUMENTS].

Patents have been granted in all cases, unless otherwise stated. Drawings accompany the Specification where the abridgment is illustrated and also where the words *Drawings to Specification* follow the date.

A.D. 1855.

270. Imray, J. Feb. 5.

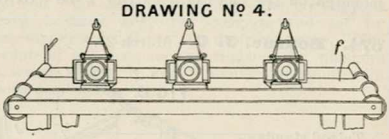
FIG. 1.



Telemeters.—A half-silvered mirror *c* is mounted at an angle of 45° on a triangular bar *a*, on which a second mirror *h* slides. The distant object is observed by a telescope *b*, directly through the unsilvered part of the mirror *c* and indirectly by light reflected into the telescope in succession by the mirrors *h* and *c*. The two images thus produced are superposed by sliding the mirror *h* along the bar which is graduated to indicate the range.

313. Sparkhall, E. Feb. 10.

DRAWING Nº 4.



Magic-lantern apparatus.—Magic-lanterns for scenic exhibitions are mounted in series on travelling bands *f*. The pictures are thrown on screens of silk, muslin, or the like, interposed between the lanterns and spectators.

320. Bellford, A. E. L., [*Kuhlmann, F.*]. Feb. 10.

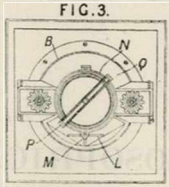
Lenses.—Lenses for optical instruments are made from pieces of "crystal," which are built up by uniting smaller polished pieces by means of a solution of soluble potassium or sodium silicate.

9.3—1000—3/04 Wt 22104 L & M

455. Small, A. March 1.

Compasses, magnetic; theodolites.—The compensating magnets for a compass B are attached horizontally to nuts H which can be raised and lowered in the binnacle by screws I against a scale K. In one case, two magnets mounted at right-angles are employed; in another, four magnets form the sides of a square. At the top of the binnacle, an instrument for determining the sun's azimuth and altitude is shown. It consists of a dummy compass card in a case N pivoted athwartship. Above this, on a graduated horizontal arm, a pair of vertical sights P, Q are fixed by means of which the azimuth is determined. The length of the shadow thrown by a sliding bar R being given, the height of the bar determines the altitude. In a modification, three circular or circular arcs are used. The rolling inclination of the ship is indicated to guide the compass correction by a pendulum M against a scale L.

FIG.3.



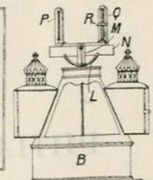
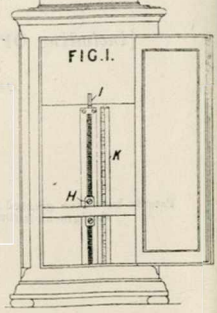


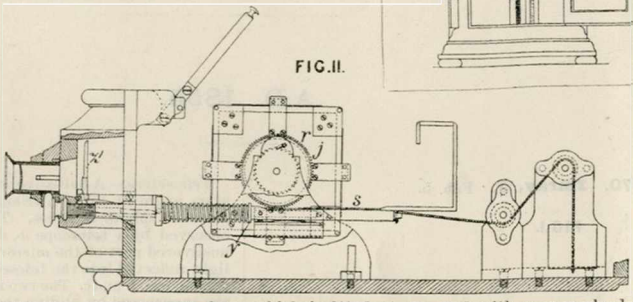
FIG.1.



515. Claudet, A. F. J. March 8.

Stereoscopes.—The case is made with its sides curved to prevent as much as possible the entrance of extraneous reflected light to the eye. To accommodate people with different inter-pupillary distances, the lenses are stopped down to horizontal strips. The two eye-tubes may be connected to a sliding fitting to allow of adjustment for abnormal sight. Distortion is avoided by using centered instead of decentered lenses. Fig. 11 shows a section of apparatus for showing in succession four stereoscopic slides. These are mounted on the faces of a carrier *j*, the axis of which is fitted at one end with a spur-wheel *r*, working in one direction only, driven by the reciprocation of a rack *s* worked by a handle against a spring *y*. A shutter z^1 is worked from the rack-bar to close the eye-tubes automatically during the changing of the slides.

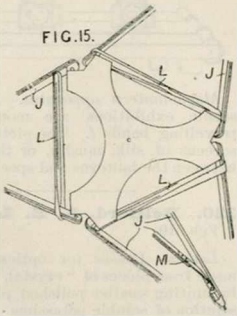
FIG.II.



674. Bourne, J. C. March 27.

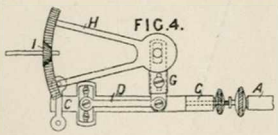
Tripod stands.—A camera tripod stand is shown in plan. Each leg J is in two halves connected by a spring M and held on the pins of the tripod top by an elastic band L.

FIG.15.



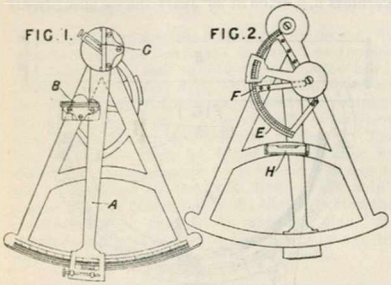
684. Hudde, F. E., and **Fouquet, J. B. E.** March 28.

FIG.4.



Pyrometers.—An expanding bar A, carried by brackets in a baking oven and protected by fire-bricks, works against a slide C connected by a link D to a radius arm G of a circular rack H. This rack engages with a pinion I, upon the axis of which an index is mounted.

727. Hedgcock, T. March 31.



Quadrants.—The Figures show opposite sides of an instrument for determining solar altitudes without referring to the marine horizon. The horizon glass B is mounted on an index arm which rears against circular arc scales E and F, graduated from the centre in both directions. In front of the usual mirror A on the main index arm A is mounted a "detector" mirror G for latitude and longitude observations. A spirit level H is also fitted.

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850. Danchell, F. L. H. April 18. [*Provisional protection only.*]

Anemometers.—Relates to a method of indicating the force of the wind by the rarefaction or exhaustion produced, which is indicated by the extension or compression of springs. The air is made to pass into an open tube communicating with a vessel containing the liquid or elastic or solid body used as a medium for indication.

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852. Fordred, J. April 18. [*Provisional protection only.*]

Reflectors.—Reflecting surfaces for various purposes are made by sticking Dutch or white metal leaf, or pale gold leaf, to glass with a solution of isinglass.

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875. Johnson, J. H., [a communication]. April 19.

Telescopes &c.; spectacles &c.; compasses, magnetic.—Opera and spying glasses, spectacles and eyeglasses are stated to be moulded from india-rubber or gutta-percha, or compounds of them, and are hardened by steam-heating or vulcanization, while in the mould or subsequently to removal.

917. Smyth, C. P. April 24.

Levels are made with a radius of curvature equal to the focal length of the collimator lenses used with them. The size of the bubble is regulated from a reservoir formed by a perforated diaphragm.

Optical instruments; sextants; theodolites; surveying instruments.—Collimators may have their focal lengths varied by an alteration of the distance between two lenses of the objective. The vernier for reading the angle may be fixed and read against the divided limb of a moving circle. A micrometer tangent-screw may also be employed. In reflecting instruments, the light from each object is reflected once before reaching the eye.

Telescopes.—The telescopic and plain tubes of reflecting-instruments are made of a single block permanently attached to the frame of the instrument. An equatorial instrument is fitted with a telescope tube capable of a motion about its own axis and resting in a frame which has an angular motion in altitude and azimuth. A reflector mounted on an axis at right-angles to that of the telescope is mounted in front of the objective.

Stands for instruments are fitted with screws each of which is fitted with nuts to engage a foot of the instrument. They may be made hollow for lightness so that they can be filled with liquids &c. when great steadiness is required.

Gyroscopic apparatus.—To preserve the level of bodies on board ship, such as tables, shelves, &c., they are mounted on a pivoted frame carrying gyroscopic apparatus.

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976. Boyd, J. E. May 1.

Compasses, magnetic; courses, indicating.—To prevent variation due to local conditions, magnets or pieces of loadstone, iron, &c. are placed near the compass. The compass magnet is spirally formed. To assist in steering, a dummy compass card is fixed near the compass and set by machinery to indicate the desired course. The points of the compass are replaced by numbers starting at the N and S points and running in both directions.

1039. Gedge, J., [*Sécrétant, J. B.*]. May 9. [*Provisional protection only.*]

Spectacles.—Cases for spectacles are made of melted horn or shell moulded in the exact form of the article.

1128. Bassie, P. B. May 21. [*Provisional protection only.*]

Ellipsographs.—A movable arm, with a universal joint at its outer end to carry a pencil, is carried by a pillar fixed to a base-plate which is adjusted to determine the axes of the ellipse. A second arm carries a guide-plate the setting of which is effected by a sector.

1244. Lubbock, Sir J. W. May 31. [*Provisional protection only.*]

Telescopes.—To enable observations to be made in a direction at right-angles to the axis, the objectives of telescopes &c. are fitted with reflectors, or reflecting prisms.

1285. Tenwick, J. June 5. [*Provisional protection only.*]

Specific-gravity estimating-apparatus for marine boilers. A hydrometer is introduced into a tube similar to that of the water-level indicator.

1456. Leiss, F., and **Schneider, C.** June 26.

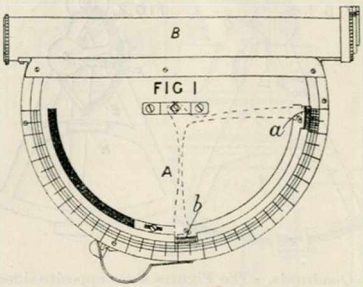
Magic-lantern apparatus; chromatropes.—Consists in the use of mica for lantern slides and chromatrope figures. The raw material is cleaned and then slit into sheets, sometimes being coloured and hardened in its raw state. Drawings &c. are put on the mica by hand or by any printing process, and painted. The mica may also be backed with paper printed with drawings &c. in transparent colours, rendered so by a clearing-liquid or by gelatine fixed underneath, and protected by a varnish, or glass, backing. When affixed to glass, cements which are transparent, waterproof and fireproof, are employed, and an edging of metal, cement, or gutta-percha is added to protect the mica. After the colouring process, the device produced may be burnt into the mica to ensure durability.

1713. Smith, A. July 27. [*Provisional protection only.*]

Spectacles, cases for.—Relates to spectacle cases made flat for the pocket. The greater portion of the length is in one piece, while the remainder is formed with two separate doors, hinged one at each side. One or both doors may be opened to completely expose the upper end of the spectacles enclosed.

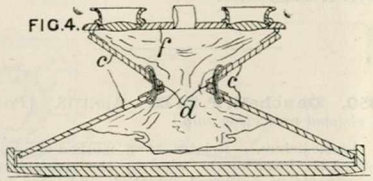
1736. Colby, H. July 31.

Clinometers; sextants &c.—A graduated semicircle A is fixed below a pivoted sighting-telescope B. The angle of elevation is read off against verniers *a*, *b*, fixed at 90° apart and swinging freely



under gravity. The frame carrying the verniers is adjusted by an adjustable hanging weight. Specification No. 1200, A.D. 1854, is referred to.

1842. Shears, G. Aug. 14.



Stereoscopes.—A folding instrument is made by hinging each end piece *c* in two parts at *d* to enable the hinged top *f* to be collapsed in the way shown. The hinge may be extended by a rubber band.

1955. More, J. Aug. 30. *Drawings to Specification.*

Compasses, magnetic.—To prevent derangement by local attraction, the needle is first coated with a resin, such as shellac, and then embedded in cork or pith. The inside of the compass bowl may be similarly lined.

1990. Flynn, H. E. Sept. 3. [*Provisional protection only.*]

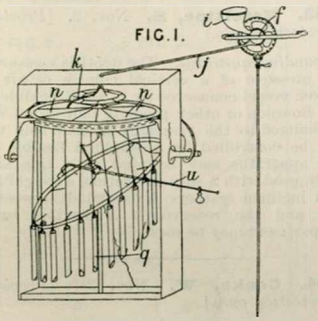
Reflectors showing objects not directly visible. A small adjustable mirror is attached at each side of a railway carriage, in order that the guard may see anything overtaking the carriage. A reflector with one or more plane or other surfaces is fixed in front of the driver of a train, to reflect to him light from a signal lamp in a guard's carriage.

2045. Allan, T. Sept. 8. [*Provisional protection only.*]

Compasses, magnetic.—Relates to means for counteracting the deviation of ships' compasses. The ascertained line of the ship's magnetism is placed in a line, say, N.E., and a circle about six feet in diameter is described around the compass. In a line N.W. on that circle a bundle of soft-iron rods, sufficient for a counterpoise, is placed. The true north can then be found at any time by shifting the counterpoise until the needle bisects the arc bounded by the N.E. line of the ship's magnetism and the radial N.W. line on which the counterpoise is placed. In another plan, the counterpoise is placed on a line S.W., to act by repulsion on the south pole of the needle.

2161. Gray, W. D. Sept. 28.

FIG. 1.



Logs; compasses, magnetic; course indicators.—A log screw drives, through bevel gearing, a wheel *f* which as it rotates allows shot from a hopper *i* to pass, one at a time, to a tube *j*. This tube discharges into a second tube *k* mounted on a compass card, which delivers the shot into a number of cells *n* from which they pass into corresponding pockets *q* on a ring pivoted at the centre. The course is then indicated by the tilt of the ring, and the distance by means of a small steelyard *u* giving the force required to bring it into a horizontal position. The apparatus may in some cases be operated by clockwork.

2261. Gedge, J., [*Sauzay, H.*]. Oct. 10. [*Provisional protection only.*]

Camera lucidas.—An apparatus, for use in drawing, on card, designs for ornamenting fabrics, comprises a framing carrying an object-glass, two lamps, and reflectors, and two framings, of different sizes, the smaller of which moves within the other and supports a network of threads by means of an arrangement of rollers and pulleys. The design to be drawn is supported by the smaller frame. The apparatus can be moved vertically upon two pillars by means of chains and counterweights. Beneath the apparatus is the drawing table, the size of the image being varied by moving the apparatus up or down towards the table.

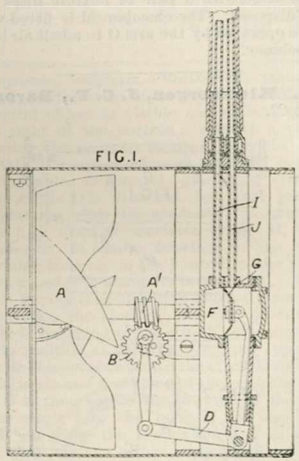
2306. Negretti, E. A. L., and **Zambra, J. W.** Oct. 15.

Thermometers; barometers.—To indicate the lowest level to which a column of mercury has descended, a conical steel &c. needle, of the shape shown, is inserted in the bore of the tube. This needle descends with the column but does not rise with it. A thermometer may be fitted with two indicating tubes, one constricted more than the other, to serve for registering maximum and minimum temperatures, and in the single form the cylindrical bulb may be bent horizontally to shorten the length of the instrument. For tubes of large bore, the needle may be made hollow and loaded with mercury.

FIG. 3.

2331. Adcock, J. Oct. 17.

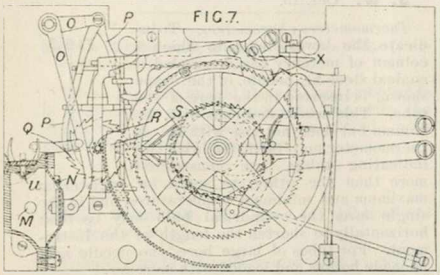
FIG. 1.



Logs.—The axle of a screw A, driven by the passage of a ship through the water, has mounted upon it a worm A^1 gearing with a wheel B. This wheel, through an adjustable crank-pin and levers D, causes the reciprocation of an elastic diaphragm G, one side of which is open to the atmosphere by a pipe J, while the other communicates by a pipe I with a chamber M, Fig. 7, also fitted with an elastic diaphragm N. The rotation of the wheel or screw A thus sets up a reciprocation of the diaphragm N, which may be placed at any con-

venient part of the ship. The motion of the disc N is transmitted by a bell-crank lever O to a pair of pendent pawls P which as they rise and fall drive the toothed wheel Q. A pinion R on the axle of Q gears with a toothed segment on a larger wheel S, an adjustable pin on which comes into contact each mile with a pawl X driving the units dial. The movement of this pawl,

FIG.7.



which drives a series of three concentric graduated dials, disengages the pinion R from the segment which then flies back under the action of a spring to its starting position. The chamber F may be fitted with a pair of flexible discs oppositely disposed. The chamber M is fitted with a valve *u* operated by the arm O to admit air in case of deficiency.

2396. Kleinsorgen, J. C. F., Baron de. Oct. 27.

FIG.1.

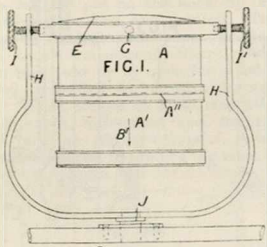
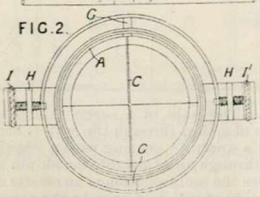


FIG.2.



Compasses, magnetic.—The needle, with its card, is pivoted in the base of the casing, which consists of two glass cylinders A, A^1 screwed together. At the junction A^{11} is mounted a fixed compass card having its north point directly above an arrow B^1 engraved on the lower cylinder. A very thin brass blade or style C is fixed above this upper card along the N. and S. line. A cover lens E concentrates the light on the card. The whole is supported by gimbals G, I, I^1 in the frame H which turns on the support J. To ascertain the variation, the instrument is set at mid-day so that the shadow of the blade C falls in line with the north and south line of the fixed compass card. The variation is then indicated by the divergence of the magnet needle from the arrow B^1.

2417. Chappuis, P. E. Oct. 30.

Reflectors of polished metal are protected by plain or figured covering plates of glass secured and cemented peripherally.

2453. Heseltine, S. Nov. 2. [*Provisional protection only.*]

Sounding-apparatus.—The depth is measured by the pressure of a vertical column of air in a sunken vessel connected by a small flexible tube to a Bourdon or other pressure indicator. Water is admitted to the vessel by a small hole which may be controlled by a weighted flexible tube. The apparatus may be used as a tide signal. When used with a ship in motion, a weight fitted with inclined feathers is situated between the ship and the reservoir. A flexible bag or compartment may be used.

2624. Cooke, W. Nov. 21. [*Provisional protection only.*]

Reflectors are made by bolting &c. a sheet of some highly polished metal between two plates of glass.

2769. Gray, J. Dec. 7. [*Provisional protection only.*]

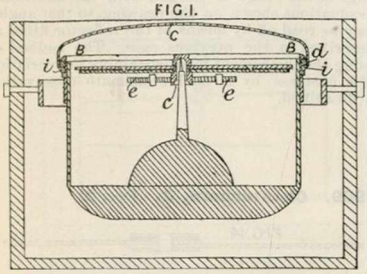
Compasses, magnetic; telescopes.—A telescope is fitted to a compass to enable magnetic azimuths to be taken. A short vertical cylinder carries a graduated glass circle which can be set to the compass beneath. When this has been done, a telescope, suitably mounted, is directed to the object whose azimuth is desired, after which it is lowered into a horizontal position, and a mirror placed in front of it to reflect the circular scale on which the azimuth is then read.

2794. Tolhausen, A., [*Prime, J.*]. Dec. 11.

Compasses, magnetic.—Comprises (1) a watertight cover for the compass box, and (2) means for balancing the compass card and needle. A glass cover C, formed with a rim, fits over a metal ring B, but is separated therefrom by a ring *d* of some yielding material as india-rubber, to prevent the glass cover being cracked by inequalities of expansion. A layer of putty *i* makes the box

water-tight. To balance the card, the centre socket c is provided with four arms *e*, *e*, having nuts or sliding weights thereon.

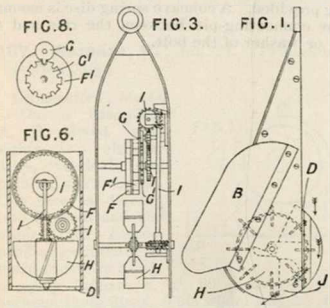
FIG.I.



2823. Friend, J. W. Dec. 14.

FIG.8. FIG.3. FIG.1.

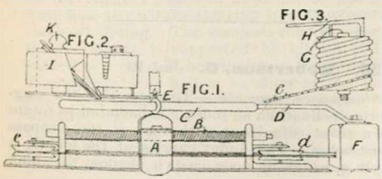
FIG.6.



Logs; sounding-apparatus.—The log is kept submerged by vanes B, Fig. 1. Water passes in by the aperture D and through the passage J so as to rotate the fan wheel H and operate counting-mechanism, Fig. 3. Toothed pinion and screw wheel gearing I rotate the units wheel F and a cam G, Fig. 8, which drives the wheel G and tens wheel F. The wheels F and F' carry the numbers upon their edges. Fig. 6 shows a recording sounding lead upon the same principle. The fan wheel H revolves as it descends and operates registering wheels by similar mechanism, the fan wheel being locked during hauling up.

2834. Hutchinson, E. B. Dec. 15.

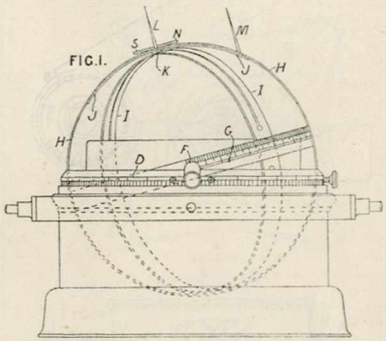
FIG.3.



Ellipsographs.—Relates to apparatus for cutting, drawing, moulding, or otherwise forming elliptical figures. A right and left hand screw B, journalled in a centre block A, is rotated to adjust the distance between brackets carrying pulleys c, *d*. A tube C, containing a spiral spring and a piston D, is held in a ring E. A box F contains "a large screw or pulleys G, round which is the "endless band *e*, *e*, *e* regulating the size of the "ovals by means of a spanner H, secured with a "nut, and I is the cutting-box with movable face-"plate regulated by a thumb-screw K."

2856. Small, A. Dec. 17.

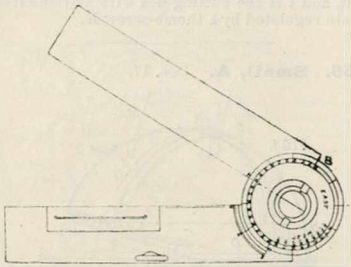
FIG.I.



Compasses, magnetic.—Relates to means for ascertaining the error of the compass needle when a celestial object is visible and without requiring a sight of the horizon; also to a mode of correcting the error by means of magnets. Upon or within the upper edge of the bowl is placed an adjustable, horizontal, graduated circle D. To the circle D is attached, by pivot joints F, an equatorial ring G, graduated in hours &c., to which is fixed a meridian ring H, which may be slit to enable bearings to be taken. A movable hour circle I is jointed to the ring H as shown and slit along its centre line. A segment J, having a centre line marked upon it, is centred upon the stud K, and may be slit also. A style L is affixed to the stud K or in any other suitable position as M. In using the apparatus, the circle D is set round until the circle H coincides with the north and south line of the compass. The circle G is then set to the latitude of the place and the circle I to the hour of the day. The ring D carrying the circles G, H, I is moved round until the sun either casts a shadow from the style on the centre line of the segment J, placed immediately over the ring I, or is seen through the slits in the latter. The error is then shown by the angle between the circle H and the north and south line of the compass, and may then be corrected by a small magnet S N. In another method of correcting the deviation, two adjustable curved or segmental magnets are attached to the circle H. When used for a common steering compass, four magnets and two circles are employed, the circle H being parallel

to the ship's keel and the other at right-angles thereto. The circles are both graduated. A pointer and graduated segmental scale showing the inclination of the ship are attached to the binnacle or compass card.

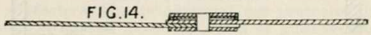
2867. Glover, F. R. A. Dec. 18.



Clinometers; sextants; compasses, magnetic.—Relates to improvements on the invention described in Specification No. 8256, A.D. 1839. The edge of the hinge is marked with the additional graduations shown on the drawing, so that angles may be read off by means of the reflector fitted as described in the previous case. The method of using the instrument for ascertaining the variation of a compass by a double azimuth observation is described.

2909. Chesterman, J. Dec. 22.

FIG. 14.



Rulers; squares.—Relates to the joints of rules capable of being folded so as to be used either as straight edges or as squares, suitable stops being provided. A concave spring disc is mounted on the connecting-pin between the rule and the head or washer of the bolt.

A.D. 1856.

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69. Barrie, W., [*Morlot, A.*]. Jan. 9.

FIG. 1.

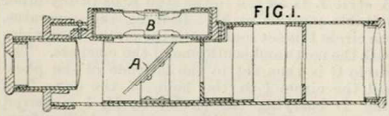
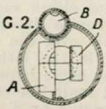


FIG. 2.



Telescopes; levels; sextants; range-finders.—Telescopes for use with various instruments are fitted with a spirit level which can be sighted simultaneously with a distant object. Figs. 1 and 2 show longitudinal and cross sections respectively. The level B is mounted on the top and slightly to one side so that it is reflected in one side of the field of view by a mirror A mounted at an angle of 45° to the axis of the telescope. On the opposite side of the field of view a scale D may be placed for determining distances. The plane mirror A may be replaced by a convex one. A second mirror may be employed to reflect the horizon into the field of view.

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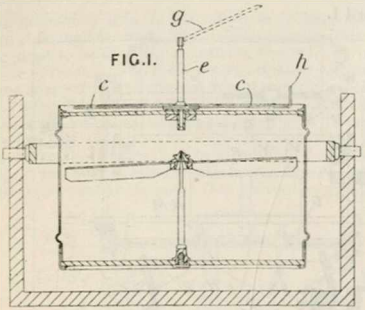
155. Robertson, C. Jan. 19.

Compasses, magnetic.—To determine the magnetic declination, an index c is mounted to rotate on a pivot coincident with that of the compass card below. This index carries at the middle a style *e*, which at noon casts a shadow, to which



the index c is adjusted. A second style *h* may be used for sighting the sun through coloured glasses. An auxiliary style *g* may be used in low latitudes.

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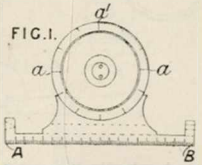
187. Samain, P. Jan. 24. [*Provisional protection only.*]

Clinometers; levels. — On a base-plate A, B, fitted with sights, two circular discs, vertical and parallel, are mounted. One disc is divided into degrees and the other into corresponding gradients. A weighted wheel, carrying indexes *a*, a^1, 90° apart, is mounted between these discs. This wheel may be replaced by a diametral index weighted to keep it in a horizontal position.



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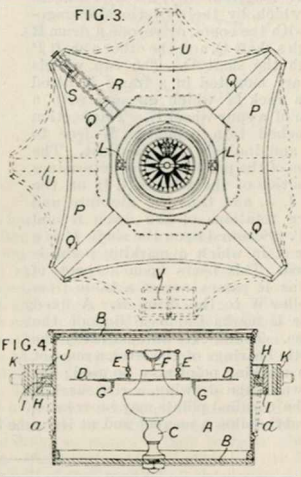
639. Graham, W. March 17.

Compasses, magnetic.— Relates to the suspension of the card and bowl, and also to means for neutralizing the effect of local attraction, and to a system of adjusting the compass on board ship. The corrective arrangements for local attraction are based on those described in Specification No. 2521, A.D. 1854. The bowl A, Fig. 4, having glass ends B, is supported by a rubber ring H, resting on the flange I; pins J, attached to the bowl, work in a slot within the ring I, so as to prevent the bowl sliding. The compass card D, carrying the needles G, is supported by hinged rods E, jointed to a pivot F, bearing upon the pedestal C. The pedestal C is hollow, to allow of the movement of a weight attached to the piece which supports the pivot F. The compass bowl may also be supported by connecting it to the ring I by adjustable links *a*. The ring I is supported by pivots connecting it to the gimbal ring K, the centres of which are supported in adjustable sockets in the pedestal. The correcting magnets are arranged upon the binnacle platform P, in metal cases, as shown at R, Fig. 3, and are adjusted by means of screws S. Four magnets are arranged in radial positions Q, but additional magnets, as shown at U, V, may be fitted. The gimbals may also be constructed so as to be external to the corrective magnets, the compass bowl being a fixture. The compass is adjusted on board ship by fixing it fore and aft, and placing corrective magnets on opposite sides of the compass card. The ship being swung, the fore-and-



aft magnets are adjusted until the needle points correctly. After an opposite swing, two additional magnets are put down, one on each side of the compass card, so as to occupy the positions with relation to the earth which the first pair originally occupied, and are then adjusted to bring the needle again to the correct position. The last adjusted pair of magnets are then removed and placed on a line running north and south, and at their previous distance from the centre of the card. Similar adjustments may be made by using a third pair of magnets.

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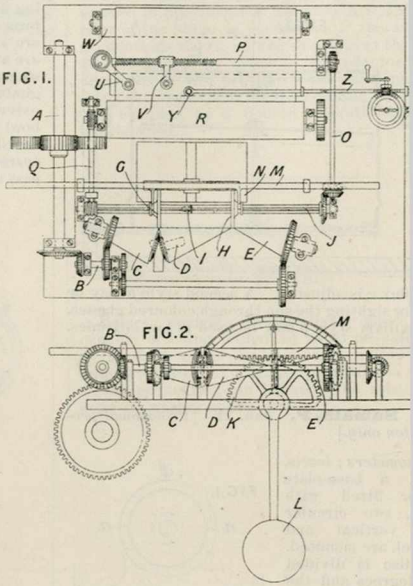
716. Liley, J., [a communication]. March 26. [*Provisional protection only.*]

Telescopes and opera-glasses.—A sliding tube for telescopes and opera-glasses "has two grooves "one on each side of the tube, in which slides a "piece of iron, uniting a ring to a nut in which "passes a vice held obliquely to the tube; this "vice has a head, which, by turning the tube "with the hand, suffices to make the ring turn up "and down at pleasure."

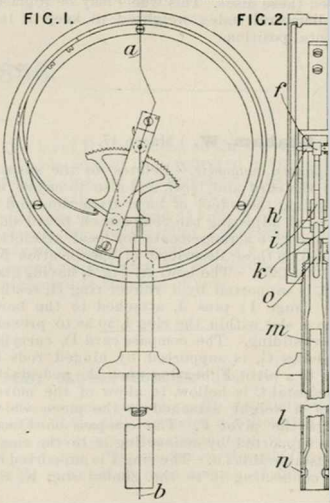
787. Newton, A. V., [a communication]. April 1.

Contouring; roads, determining inclines and curves of.—Relates to apparatus for automatically recording road gradients. Figs. 1 and 2 show a plan and elevation respectively. The axle of the vehicle upon which the apparatus is mounted drives, through spur gearing, a shaft A, the end of which is connected by bevel-wheels to a shaft B. From this shaft cones C, D, E are driven. Keyed upon two shafts I, J, but so as to be free to move longitudinally, are two wheels G, H, which, by their frictional engagement with the cones, drive, one a drum R through a shaft Q, and the other a shaft P through the shaft O. The two wheels G, H are mounted in a frame N fitted with a rack M which engages with a section of a spur-wheel K. This section is attached to a pendulum L free to swing and indicate the gradient. The position of the pendulum thus determines the position of the wheels G, H on the shafts I, J, and thus the absolute and relative rotations of the drum R and shaft P. Screwed upon the shaft P is a carrier V in which a marking point is mounted. This bears upon a sheet of paper as it passes across a table from the roller W to the drum R. A fixed pointer U marks the base line of the diagram. To indicate automatically the magnetic bearings of the road, a magnet with a marking point may be used; or, as shown on the drawing, a ring marked with the cardinal points may be rotated by hand to follow a magnet and at the same time operate longitudinally a rod Z carrying a marker



846. Gauntlett, W. H. April 7.

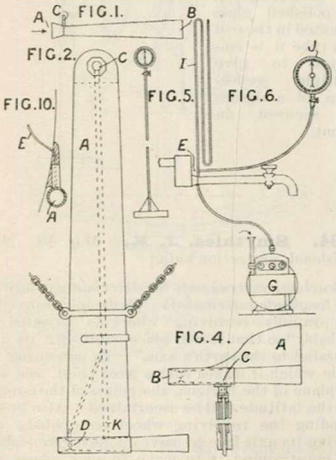
Pyrometers and thermometers.—Fig. 2 shows a section on the line *a*, *b*, Fig. 1. The temperature is indicated on a dial by a pointer mounted upon a spindle *h* gearing by a pinion *f* with a toothed sector *i* pivoted at *k*. An extension of the sector is pressed by a spring against a stud *o* on the top of a metal tube *m* which is secured at *n* to a second tube *l* of some different metal, to the top of which the frame of the instrument is secured. The compound tube *l*, *m* is inserted in the funnel, say, and the instrument then registers the differential expansion.



870. Fontaine-Moreau, P. A., Comte de, [a communication]. April 11.

Anemometers; current meters; logs.—The apparatus consists essentially of a double conical tube A, B, Fig. 1, through which the water or air current passes and a tube C at right-angles, through which air is exhausted by the current passing through the cones. The tube C communicates with a vacuum-indicating apparatus. Fig. 4 shows the apparatus arranged as an anemometer. A vane A is attached to the sheath in which the

double conical tube is placed so as to keep the end B facing the wind. Fig. 5 shows the apparatus mounted to be used for measuring the velocity of river currents. Fig. 6 shows the double conical tube adapted to measure the flow of water in pipes. The tube E is in communication with a column of mercury I, an indicator J, or a gas meter G. When used to find the speed of ships, the apparatus is fixed in a sheath attached to a suitable frame A, Fig. 2, and held parallel to the keel. The conical tube is pierced at the point D to prevent clogging.



The tube K, C has a stop-cock at C so arranged that the frame may turn on its axis at C and be lifted out of the water when required. In a modification, the frame A may be made to turn about a central axis; or, the double conical tube may be fixed in a wooden frame or metal plate attached permanently to the vessel, as shown at A, Fig. 10, the communicating tube E entering the interior of the vessel directly. The indicator dial is provided with graduations to show both the pressure and the speed.

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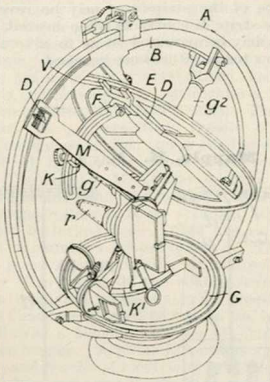
896. Olley, W. H. April 15. [*Provisional protection only.*]

Microscopes combined with photographic cameras. The microscope is provided with a reflecting-prism or other reflector attached to the eye-piece. The camera is mounted above it, so that the image is reflected upwards on to a ground-glass plate. The ground-glass plate is carried by a frame or box sliding within the camera body, so that the plate can be raised or lowered to alter the size of the image. After adjustment, the ground-glass plate is removed, and a sensitized plate or paper substituted.

939. Stansbury, C. F., [a communication]. April 19.



Sextants; latitude instruments.—A vertical meridian circle A, free to rotate about a vertical axis, has within it a latitude circle B carrying a radial axis g^2 upon which the hour circle D is mounted. Upon this axis is also mounted an arm E carrying a vernier V and a curved rack F which can be clamped to the declination arm M. Upon the azimuth circle G, attached to the circle A, a sextant of the ordinary type is mounted which is free to rotate about a vertical axis. The declination arm M is free to rotate about a horizontal axis g. The clamp K is also fastened to an arm which moves about the axis g, and in doing so causes a limb to move about an axis r. This motion is read off on an arc K^1 and is one-half of that read off on the circles A and B. In taking an observation, the latitude circle and the declination arm are set to the given values. The arm M is then removed, after which the limb E being moved over the face of the hour circle gives motion to the rotating sextant and azimuth and altitude verniers. When the celestial object is thus brought on the horizon, the azimuth, altitude and time may be read from the instrument.

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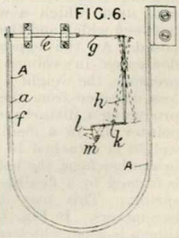
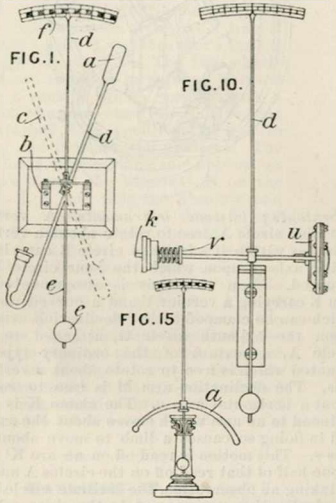
957. Symons, A., and **Burgess, E.** April 22.

Thermometers.—A compound strip A made up of a strip a of gold and a strip f of steel or zinc, and forming part of a fire &c. alarm, rotates, by means of the slide e, links g, k, and levers h, l, a spindle m carrying an index. The index may be retained by a pawl engaging with a ratchet-wheel on the spindle m. The surface over which the free end of the strip



moves may be graduated and furnished with a stop to retain the strip in the position to which it is moved by a rise in the temperature. The positions of the strips *a*, *f* may be reversed, so that the strip A contracts when heated, and the devices may be arranged so as to give an alarm when low temperatures are reached.

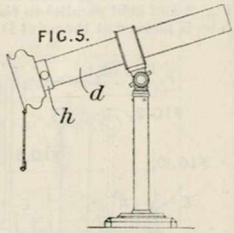
1029. Mapple, H. May 1.



Barometers.—Relates mainly to balanced forms, though some of the improvements are applicable generally. A barometer tube *a* is fixed to a frame c resting by knife-edges on brackets *b* and which also has attached to it a pointer *d* and weight *e*. The displacement of the mercury disturbs the balance which registers on a scale *f*. As indicated in broken lines, a thermometer may also be fixed to the frame to balance purely temperature effects. As shown by Fig. 10, a vacuum capsule *u* is mounted on a balanced rectangular frame *v*. To the capsule is attached a rod, upon which a weight *k* is secured, and between which and the frame *v* a spring is interposed. As the capsule, therefore, increases or decreases in volume under the atmospheric pressure, the weight *k* is pushed to a greater or less distance from the axis of suspension, thus producing a disturbance which is indicated by a pointer *d*. In a modification of this form, the weight is attached to a rod within the capsule; in another form, the bottom of the mercury cistern is formed by a flexible diaphragm attached to a spring. This may be applied to stationary barometers. In Fig. 15 a closed curved vacuum tube *a* is used, which coils and uncoils under the atmospheric pressure. This vacuum tube may take various forms—sinuous, spiral, &c. To increase the range of a barometer, balanced or fixed, a lighter liquid may be placed above the mercury.

1062. Blake, O. May 6.

Kalcidoscopes.—A parallelopiped of polished glass mounted in the end of a tube *d* is employed to give multiple reflections of a design &c. secured in mount.



1184. Smythies, J. K. May 19. [*Provisional protection only.*]

Bearings, instruments for determining; latitude and longitude instruments; gyroscopic apparatus.—A rapidly revolving wheel is mounted on gimbals, "so that it will place itself with its axis "parallel to the earth's axis." By measuring the angle which it makes with a fixed point, and with the plane of the horizon, the points of the compass and the latitude will be ascertained. Also by suspending the revolving wheel on gimbals, and leaving its axis free to move in any given plane, and constraining it to move in such plane, and comparing the rate of revolution of the axis of the wheel with a chronometer, the latitude or longitude will be ascertained.

1245. Jundzill, A. D. May 24. [*Provisional protection only.*]

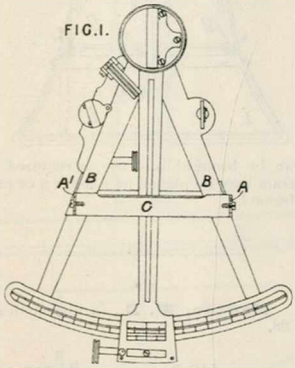
Stereoscopes.—Relates to an application of the stereoscope to a phenakistoscope apparatus. Two dises with similar phenakistoscope figures are rotated at identical speeds by means of a crank, which also rotates a pasteboard disc, bored on the edge, at the same speed as the figures. The stereoscope is placed in front of the disc and figures in such a manner that the figures appear superposed through the eye pieces, by reflection in a mirror placed before the apparatus.

1258. Newton, W. E., [a communication]. May 26.

Sextants, quadrants, &c.—Relates to means for enabling the instruments to be used when the horizon is obscured; and consists of a level which

may be set true while the instrument is held in position for taking an altitude when the horizon is visible. The level then serves as a guide to enable the instrument to be held in the same position when no horizon is visible. The level is contained in a metal box C, which fits between

FIG.1.



two plates A, A¹, attached to the sides B, B. The front plate A is provided with a vertical slot, and the back plate A¹ with a horizontal slot, by means of which slots the adjustment of the level is made. The centre of the horizon glass should be indicated by a line.

1335. Brooman, R. A., [a communication]. June 4.

Reflectors.—Glass plates are coated with metal, other than mercury or silver, by first depositing a volatile compound of the metal on the surfaces and afterwards reducing the compound by electrolysis, aided by heat. Fig. 1 shows a machine for coating the glass, and Fig. 3 shows electrical apparatus for decomposing the coating. The glass plate is placed on a box or chamber M, which is formed with a perforated cover for the passage of the gaseous fumes to

FIG.1.

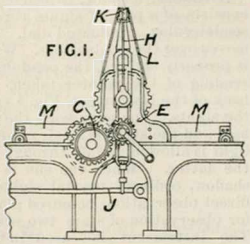
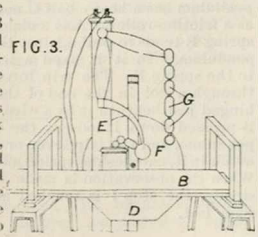


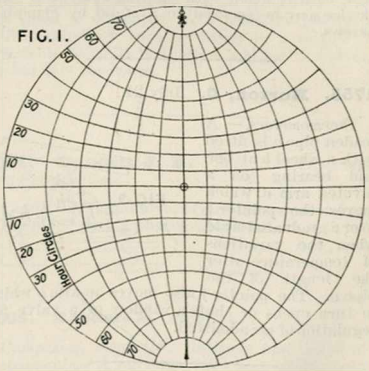
FIG.3.



the glass, and is arranged to run on guides between an endless soft band L and a roller on the axis of the wheel C. Any of the following substances may be used to produce the gas, viz.:—Oxides or salts of iron, tin, zinc, cadmium, ammonium, lead, sodium, potassium, aluminium, manganese, copper, bromine, iodine, or chloride of gold, grains of tin, "crystallized hematine," and acids, such as sulphuric, hydrochloric, benzoic, nitric, metagallic, and boric acids. The gas is generated in acid-resisting vessels of gutta-percha, earthenware, &c., and is conducted to the chamber M by flexible tubes fitted with stop-cocks. The chamber M is advanced by a handle, toothed gearing, and the rollers. The band L passes round rollers E, K on spindles, which are connected by forked rods H and are raised and lowered by counterweighted levers J. The plate of glass is moved over a roller at the end of the chamber M to distribute the coating evenly and on to an insulated metal fixing or electrolysing plate or chamber adapted to run on an insulated frame B over a heating-chamber D containing a lamp or burner. A pillar E contains a galvanic battery, and frictional electricity is generated by a glass disc machine F. It is stated that the hollow metal conductors G are lined with an acid-resisting material, and the four lowest contain a mixture of boric and sulphuric acids so that a hot gas is produced and conducted to the insulated chamber supporting the coated glass plate. Side frames C support a cloth for covering the chamber and glass. The metal is liberated and fixed by the electric current, aided by heat, and may be backed by tar, cement, &c. mixed with glue, oil colour, &c.

1636. Saxby, S. M. July 10.

FIG. 1.



Compasses, magnetic; bearings and courses, determining.—Relates to a mechanical device for the solution of spherical triangles specially useful for determining compass errors. A diagram ruled upon a transparent sheet is superposed and

rotated upon a second diagram so as to produce an intersection of fiducial lines from which the desired result may be obtained. Fig. 1 shows a

FIG.2.

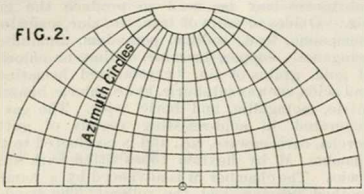


diagram for this purpose which is the stereographic projection of the meridians and parallels of a sphere. Fig. 2 is a similar projection of azimuths and almucantars.

1680. Barlow, C., [a communication]. July 17.

FIG.2.

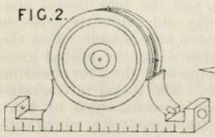
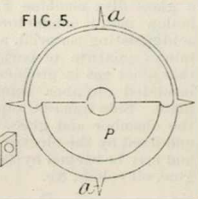


FIG.5.

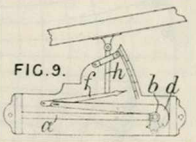


Clinometers; levels and plumbing instruments.—A weighted disc P, Fig. 5, with pointers *a*, is fitted between two circular discs, one graduated in degrees and the other to give the inclination. The base is fitted with sighting apertures. The device may be secured to a stand by clamping-screws.

1755. Burton, C. July 24.

Thermometers.— A leaden pipe *a* is fitted with a wheel *b* at one end bearing on a pivoted arm *d*, which moves the pointer *f* over a graduated scale when the variations of temperature alter the length of the pipe *a*. The pointer *f* also moves an arm *h* which in turn opens or shuts a window or a valve for regulation of air admitted.

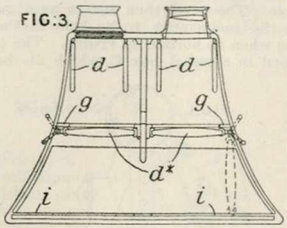
FIG.9.



1782. Cooke, G. C. July 26.

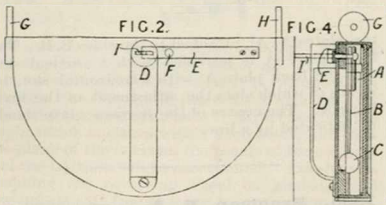
Stereoscopes.—The eye-piece mounts are made of a conical or pyramidal shape to increase the field of view. For adaptation to different sights, lenses *d*, *d** may be mounted in hinged frames so that

FIG.3.



they can be brought into use as required. The stereogram may be placed on a ledge *g* or pressed into a frame *i*.

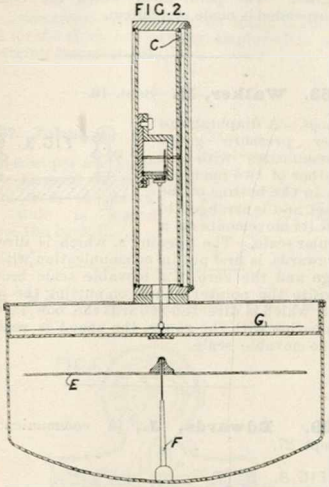
1788. Newton, W. E., [a communication]. July 28.



Altitudes, angular, measuring.—The instrument consists of a pair of sights rigidly attached to a semicircular graduated dial. A pendulum point moves over the graduations. When the instrument is properly sighted, the pendulum is fixed and the reading of the pointer taken. Fig. 2 shows the back of the instrument, Fig. 4 a section. G, H are the sights. For solar work, the sight G has a small hole and the sight H a pair of cross marks, and the light is allowed to fall through the former on to the latter. When the sun is too weak to cast a shadow, ordinary crystal sights are used. For direct observation, coloured glasses are used, and for observation of stars two semicircular sights. The instrument is cased in metal, and has a handle D at the back and a glass dial-front. The pendulum has a heavy ball C near the point to act as a friction-roller. A is a clamp piece which the spring E tends to pull against the pivot end of the pendulum. To it is fixed a wire soldered at F to the spring E. The trip lever or stop I passes through a slot in the end of the spring E and is hinged just beneath it by a wire. When the spring is pressed down, it loosens the clamp A from the pendulum, and the trip lever or stop, which has a notch in it, catches the spring and holds it in place. When the observation is made and the pendulum steady, the stop I is touched and the pendulum made fast.

1888. Maillard, N. D. Aug. 12.

FIG. 2.



Compasses, magnetic.— Relates to double-needle compasses, and to indicating arrangements for the same, which are applicable also to single-needle instruments. Above an ordinary compass needle E is another, independently-mounted, weaker needle G whose upper axis consists of a rod having a horizontal crown-wheel at its upper end. This works a vertical cog-wheel attached to a pointer C moving round a vertical dial. The whole of the upper part is cased in a circular box mounted on gimbals by studs at its sides. The strong needle setting N. and S. attracts the weak needle S. and N. and so actuates the pointer. A single needle (the upper) may be used, being then magnetized more strongly. Other mechanical contrivances, *e.g.* groove-pulleys, trains of wheels, or bands may replace the two cog-wheels, or the dial may be horizontal and the pointer fixed to the vertical shaft.

1935. Sutton, E. Aug. 19. [*Provisional protection only.*]

Stereoscopes.—To make the instrument portable, the ends which support the top upon which the lenses are mounted are hinged so as to fold in. The hinges are pressed upon by a spring to keep the parts in position.

1965. Benoist, P. Aug. 23. [*Provisional protection only.*]

Stereoscopes combined with phenakistoscopes. Two stereoscopic pictures are placed at right-angles to one another, and the angle between them is bisected by a grooved glass. Motion is then given to the glass to enable the two pictures to be seen quickly in succession.

2060. Moberly, W., [partly a communication]. Sept. 4.

FIG. 1.

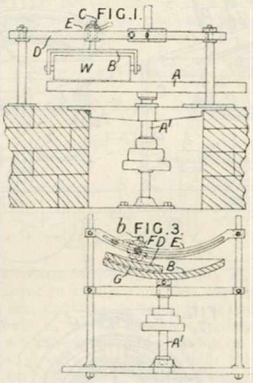


FIG. 3.

Lenses, grinding and polishing. A cylindrical, concave or convex surface is formed by a rotating flat disc A, Fig. 1, or curved disc B, Fig. 3, carried by a spindle A^1. The cylinder W is mounted in a carrier B so as to turn freely on its axis, and the carrier B has a spindle C turning freely in a socket E which may be adjusted on the slotted arm D of the frame. Weights or a spring may be used to press down the carrier B. Fig. 3 shows a piece of glass G being formed on its convex face. The glass is cemented to a block D provided with a spindle *b* turning freely in a socket F adjustable as to its inclination and position along the bar E of the frame.

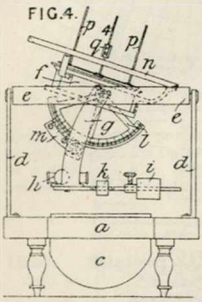
2064. Dancer, J. B. Sept. 5. *Drawings to Specification.*

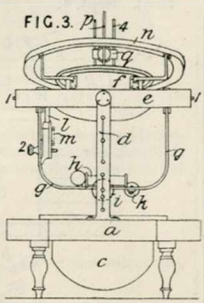
Levels.—A liquid level of circular or other form is combined with a photographic camera.

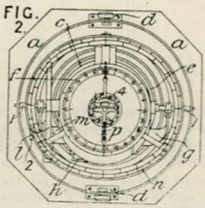
2069. Reeder, R. Sept. 5.

Compasses, magnetic; latitude and longitude instruments.—A universal dial and chronometer compass, for taking a ship's or other bearing in any latitude at any time of the day, also adapted for determining the latitude and longitude and the variation of the magnetic needle, has a base *a* carrying the gimbals supporting the mariners' or

surveyors' compass *c*. Standards *d* arranged along the north and south line of the compass box are slotted for sighting and carry a pivoted ring *e* to which a chronometer *f* is pivoted. The chronometer can be adjusted so that its dial face is in the plane of the equator and is sustained in this position by a frame *g* depending from the

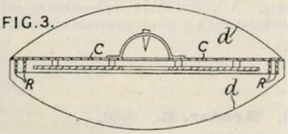






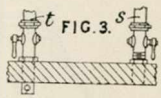
pivot I and carrying adjustable balance weights *i*, *k* and spirit levels *h*. A latitude arc is attached to the chronometer and passes against a vernier *m* with a clamping screw 2. The chronometer hand carries two wires *p* and a magnifying glass *q* adjustable on wires 4 and having its focus at a graduated equatorial ring *n*.

2156. Kline, C. Sept. 15.



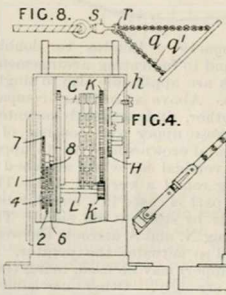
Compasses, magnetic.—The needle is surrounded with an insulating metallic shield to protect it against local attraction. In one form, iron, steel, copper, or zinc bands R or wire netting are placed concentrically around or under the edge of an ordinary compass card C. In a modification, convex metal plates *d* are fixed above and below the magnet; or a metal sphere may enclose the magnet. The point upon which the compass is suspended is made of iridium.

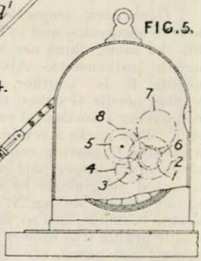
2163. Walker, R. Sept. 16.



Logs.—A diaphragm or other pressure gauge communicates with one or other of two openings *t*, *s* in the bottom of the vessel, and is arranged to show its movements on a circular scale. The opening *s*, which is directed downwards, is first put in communication with the gauge and the zero of a movable scale brought opposite the pointer; then, on putting the opening *t*, which is directed towards the bow, in communication with the gauge, the speed is read off on the movable scale.

2269. Edwards, J., [a communication]. Sept. 27.



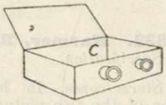


Logs.—A drag float, Fig. 8, of triangular shape, is attached by three short chains q^1, *q*, *q* to a ring *r*, and universal joint *s*, at the end of the line. The chain q^1 is shorter than the chain *q* so that the float is maintained in the water at an angle of about 45°. The line is joined to a chain wound on a spring barrel C, connected to a counting-apparatus, Fig. 4, indicating miles and fractions of a mile. A pawl and ratchet prevent the barrel moving backwards except when desired. The spring in the barrel C is held up, when pulled by the drag float, by a pawl *h* and ratchet H. A toothed wheel K on the barrel C gears into a pinion *k*, mounted on a spindle L, connected to a train of wheels 1, 2, 3, 4, 5, 7, 8, Fig. 5. A wheel 5, working loose upon a fixed stud has a collar, upon which works loosely a wheel 8. This wheel 8, which carries a pointer indicating miles on a dial, is actuated by a wheel 7, driven by a wheel 1 fixed to the wheel 2, which is in turn driven by a pinion 3, fixed to the wheel 4. A second pointer, indicating fractions of a mile, fits upon the square end of the long collar of the wheel 5.

2304. Pastorelli, F. J., and **Gibb, J.** Oct. 2. [*Provisional protection refused.*]

Thermometers.—An aluminium index is substituted for the steel one usually employed in self-registering thermometers.

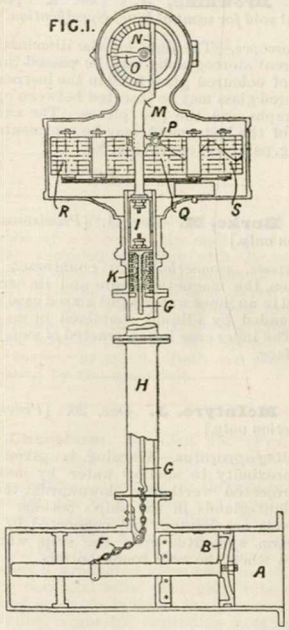
2486. Johns, G. E. Oct. 23.



Stereoscopes are made in the form of an ornamental box, as shown. The slide is placed against the back C.

2526. Ragon, A. E., [*Alexandre, L.*]. Oct. 28.

FIG. 1.

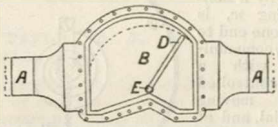


Logs.—The passage of the ship through the water causes the piston B in an immersed cylinder A to move against a spiral spring K, to which it is connected by means of a chain F and rod G passing up a tube H. A box I, fitting loosely in the tube H, and connected to the rod G, is thus moved, and thereby actuates a pointer O on a dial by means of the rack M and pinion N. A permanent record of the speed-values may be obtained by means of a pencil P fixed to the rod carrying the rack, and drawing a curve on a paper strip Q as it unwinds from a drum R and winds upon a drum S. The drums R and S may be rotated by clockwork or in any suitable manner.

2550. May, W., [a communication]. Oct. 30. *Drawings to Specification.*

Squares.—A set-square graduated on one bevelled edge is used to read off pressures on steam-engine indicator diagrams.

2551. Torassa, C. J. B. Oct. 30.



Logs and leeway indicators.—A box B, carried below sea-level on a ship, and open through pipes A to the sea, contains a vane D carried by a vertical shaft E, which carries a pointer, or is geared by a toothed wheel to a pinion on the axle of a pointer over a stationary dial; the axle is also acted on by a pulley, cord, and weight. The flow of water through the box causes deflection of the vane D and the pointer. Two such apparatus are used, arranged at right-angles, to indicate speed and deviation.

2578. Middleton, S. Nov. 3. *Drawings to Specification.*

Telescopes.—Seamless covers for telescopes are made of leather prepared from the skins of the tails, legs, and other parts of animals. The skin is cleaned and tanned, and stretched on a hollow expansible mandrel, which is then forced through a hole in a press, and the skins are dried by gas jets. Several mandrels thus covered are placed in a currying-machine. The articles are finally japanned &c., and fitted with metal mounts.

2581. Scott, E. E. Nov. 3. *Drawings to Specification.*

Stereoscopes.—The eye-pieces are fitted with complete lenses of a large size, the optical axes of which are at a distance apart greater than the inter-pupil distance. Circular decentered lenses may also be employed. Diaphragms are fitted to restrict the view of each eye to one picture.

2614. Olley, W. H. Nov. 6.

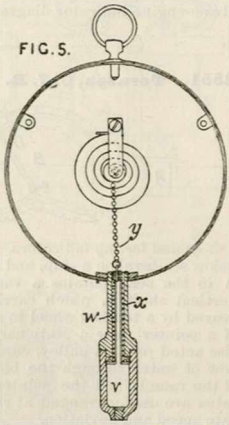
Microscopes.—Images produced by the object-glass of a horizontally-placed microscope, from

which the eye-piece has been removed, are reflected by a glass prism or other reflector placed near the eye-piece end on to a sensitized plate or surface in a suitable dark box or camera enclosing the end of the microscope and the reflector.

2615. Webster, J. Nov. 6.

Thermometers.—A closed cylinder *v* forming the bulb of the thermometer contains any suitable fluid. A rubber tube *x*, surrounded by a helical spring *w*, is fixed at one end to a chain *y* communicating with a spring-controlled pointer moving over a dial, and at the other end is fixed to the inside of the cylinder *v*. Change of temperature causes motion of the top of the india-rubber tube *x* against the action of the spring *w*, and thereby causes the pointer to move over the dial.

FIG. 5.

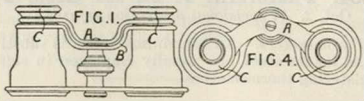


2623. Casartelli, J. L., Casartelli, A., and **Casartelli, L.** Nov. 7. [*Provisional protection only.*]

Specific-gravity estimating-apparatus.—To indicate when the water in a steam generator is charged to excess with saline matter, two specific gravity beads are placed in water-gauge-like tubes. The first rises as a warning, the second only when dilution is necessary to prevent deposition.

2674. Dixey, C. W. Nov. 13.

Opera and field glasses.—To accommodate the nose and enable the eye-pieces C to be brought close to the eyes, the connecting-bars A, B are bent as shown in Fig. 1, or as shown in Fig. 4.



2832. Harmer, R. Nov. 29. *Drawings to Specification.*

Stereoscopes.—In hand-painted stereographs, one of the two pictures is painted in different colours from those used for the other picture.

2914. Browning, J. Dec. 9. [*Letters Patent void for want of Final Specification.*]

Stereoscopes.—The light for the illumination of transparent stereographs may be passed through a sheet of coloured glass fixed in the instrument; or coloured glass may be inserted between opaque stereographs and the eye-pieces. The exterior surface of the instrument may be ornamented by silvering, painting, engraving, &c.

2934. Burke, M. Dec. 11. [*Provisional protection only.*]

Compasses, magnetic.—To counteract local attraction, the magnetic needle and its card are enclosed in an inner water-tight glazed case which is surrounded by a liquid contained in an outer case. The inner case is constructed of metal with a glass face.

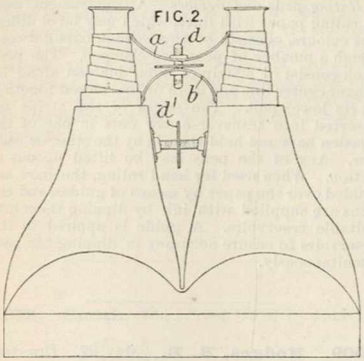
3069. McIntyre, J. Dec. 26. [*Provisional protection only.*]

Sounding-apparatus.—Warning is given of a ship's proximity to shallow water by means of rods projected vertically downwards through water-tight glands in the ship's bottom. Their lower ends are jointed, and connected by wires with alarm apparatus upon the ship, which is operated when the rods touch bottom.

A.D. 1857.

11. Phillips, W. H. Jan. 1.

FIG. 2.



Stereoscopes.—The focussing of the eye pieces is effected by a screw *d*, the ends of which are oppositely threaded to engage with the connecting strips *a* and *b*. The separation of the eye pieces is adjusted by a similar screw d^1. A skeleton stereograph may be employed to form a suitable border for the usual stereographs. The eye piece may be built up of a spirally wound strip of leather or metal. Both eye pieces may be enclosed by the same coil.

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108. Cheetham, D. Jan. 13. [*Provisional protection only.*]

Thermometers.—Relates to thermometers for ascertaining the temperature and consequently the pressure of steam in boilers. The tube or cup containing the mercury extends into the boiler, and has at its upper end (or outside of the boiler) a graduated glass tube in which the mercury rises and falls. The glass tube may be graduated so as to indicate the pressure. In a modification, a gas by expanding acts on the surface of the mercury in the cup; or an ordinary thermometer may be employed.

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168. Quin, R. Jan. 20. [*Provisional protection only.*]

Stereoscopes.—The front, back and mid partitions are hinged to allow of folding. The reflector is secured by the same clasp that secures the back and front together. The sides may also be hinged to a stiff bottom, the top being connected in a similar way. The top and bottom may also be connected by spring joints to a stiff front. The back and sides may be made of a flexible fabric to fold within the instrument.

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374. Taylor, T. J. Feb. 9. [*Provisional protection only*].

Stereoscopes.—The hinged door is fitted with a plane or concave mirror to direct light upon the stereograph. This mirror may be fixed.

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555. Johnson, J. H., [*Crandall, E. A.*]. Feb. 25.

FIG. 1.

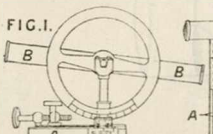
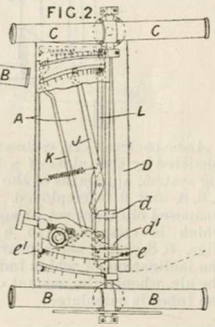


FIG. 2.



Telemeters; theodolites; sextants.—Upon one end of a base A, a telescope B is mounted at right-angles, free, however, to move over a graduated scale in a vertical plane. At the other end, a second telescope C is mounted free to rotate against a graduated scale in a horizontal plane. To obtain the range of an object, it is sighted in succession by two telescopes, when an index on the radial arm D fixed to the telescope C gives the range on a scale *e*, e^1. To obtain open scales as the telescopes approach parallelism, abutments *d*, d^1 &c. on the arm D strike in succession against pivoted and multiplying indicating levers J, K and L. Heights may be determined by using the telescope B only. For long distances, the instrument is transferred from one station to another, the telescope B being placed parallel to its first position. The telescope C may be replaced by a pair of reflectors and the instrument used as a sextant.

579. Thornthwaite, W. H. Feb. 27.

Barometers.—To facilitate the reading, the tube or that portion of it employed for observation is made with a flattened bore and covered or coated on one side with enamel, which may be combined with the glass during manufacture. Graduations are marked on the tube in lieu of or in addition to those on the supporting stand. According to the Provisional Specification, the rise and fall is registered by placing small tubes in the main tube in the process of manufacture.

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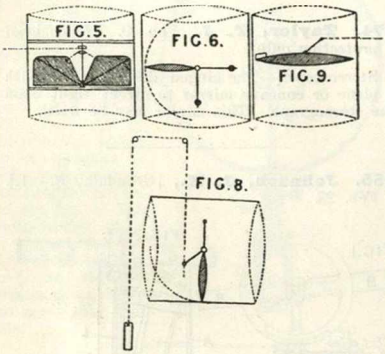
740. Moes, J. March 16.



Anemometers.—To estimate the amount of air admitted by the inlets of a heating and ventilating system, apparatus of the types shown in Figs. 5, 6, 8, and 9 is employed. Fig. 5 shows a fan composed of blades set at an angle round an axis, which is connected to a counting-apparatus. Figs. 6, 8, and 9 show nearly balanced dampers, the inclination of which indicates the velocity of the air, whence the amount of air passing through the tubes is calculated.

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990. Bright, C. T. April 8. *Drawings to Specification.*

Logs.—In the Provisional Specification, a register is described in connection with cable ships, consisting of a vane submerged in the sea and connected electrically with a system of toothed wheels on deck, whereby the speed of the ship, the total distance travelled and the length of cable payed out are registered.

1139. Rutt, W. April 22. [*Provisional protection only.*]

Microscopes; telescopes.—The lower end of the body of a microscope is fitted with a chamber to enclose the object and objective. Light is admitted by openings in the chamber. By fitting the chamber with a telescopic objective and using it in combination with an erecting glass, a telescope may be formed.

1408. Ott, J. U., and **Udloff, F. A. M.** May 19. [*Provisional protection only.*]

Ruling pens and devices.—An instrument used in ruling paper with lines, which may be of different colours, consists of two wooden bars between which a number of pens are clamped. The pens each consist of a strip of metal doubled along its longer centre line and more or less closed together at its lower end. The edges of the strips are inserted into transverse saw cuts in one of the wooden bars and held therein by the other or back bar. Any of the pens may be lifted up out of action. When used for hand ruling, the bars are guided over the paper by means of guides, and the pens are supplied with ink by dipping them into suitable reservoirs. A guide is applied to the reservoirs to ensure accuracy in dipping the pens simultaneously.

1509. Hodges, R. E. May 27. *Drawings to Specification.*

Squares.—For drawing parallel straight lines at given distances apart, similar squares of rather small angle are employed. Each is divided by lines perpendicular to its base, and the graduations are such that when the bases are parallel and the hypotenuses coincide, the reading of either apex gives the distance between the bases.

1558. Chappuis, P. E. June 3. [*Provisional protection only.*]

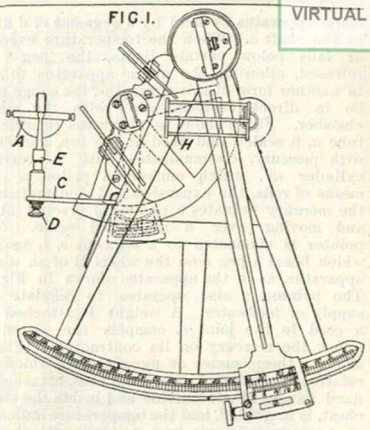
Stereoscopes.—Metallic or other reflectors are used to throw light upon the pictures.

1595. Noé, H. J. June 6. [*Provisional protection only.*]

Stereoscopes, portable. Each end piece is in two parts connected by a folding joint, the eye-lenses also being protected by a folding flap. The slide carrier is connected to the lens carrier by a bellows joint to admit of focussing. The reflecting-surfaces may be coloured. A folding case may be fitted to the bottom of the instrument.

1669. Johnson, J. H., [*Lane, J. C.*]. June 15.

FIG. 1.



Sextants, quadrants and the like; horizons, artificial; levels and plumbing-instruments.—Sextants and the like are fitted with artificial horizons and zenith reflectors. A heavy hemispherical cup A, carrying either a horizontal or vertical mirror, is mounted on horizontal pivots on a stand E secured to a bracket C. The adjustment in height is effected by a screw D. To adjust the vertical mirror normal to the axis of the eye-piece, a spiral slot and pin is employed. The horizon is obtained artificially when the vertical mirror gives an image of cross-hairs mounted in a frame H, which is seen in line with the real hairs. When the horizontal glass is used, the complement of the zenith distance is read off directly.

1678. Smith, W., [*Prost, J. M.*]. June 16.

FIG. 1.

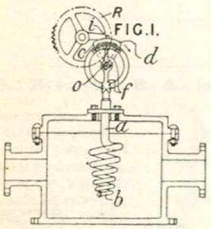


FIG. 2.

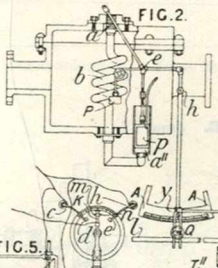


FIG. 3.

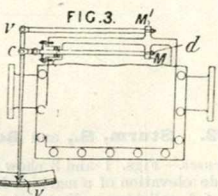


FIG. 4.

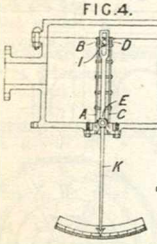
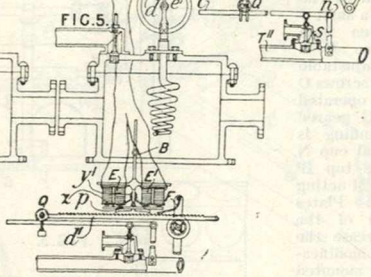


FIG. 5.

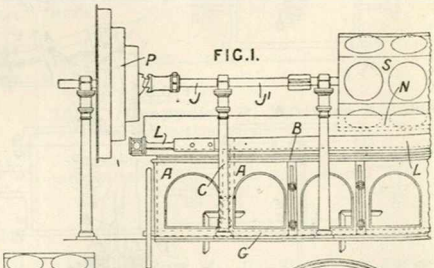


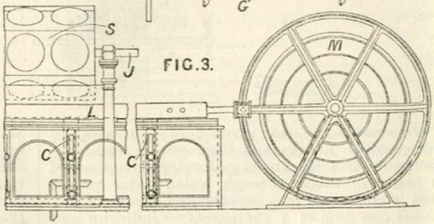
Thermometers and pyrometers.—Relates to temperature alarms and thermostatic feed-regulating devices for steam generators composed of a series of tubes, through which water passes and is converted into superheated steam. Fig. 1 shows one form of a thermometric indicator and alarm, in which a tube *a*, *b*, containing a liquid or a gas and enclosed in a steam chest, has its lower end sealed, and its upper end communicating with a pressure gauge *f*. The gauge dial is graduated by comparing it with a standard thermometer. A peg *i* on the wheel R of an

alarm apparatus is held by a segment *c*, *d* fixed to the shaft *o*. When the temperature exceeds or falls below certain limits, the peg *i* is released, allowing the alarm apparatus to act. In another form of this apparatus, the gauge may be in direct communication with the steam chamber. Fig. 2 shows an apparatus in which a tube *a*, *b*, sealed and fixed at the top, and filled with mercury, communicates with a vertical cylinder a^{11}, which encloses a piston *p*. By means of rods, the expansion and contraction of the mercury actuates a pointer *y* pivoted at *h*, and moving over a graduated scale. The pointer is connected to a segment *s*, *t*, against which bears a peg *i* on the wheel B of an alarm apparatus, as in the apparatus shown in Fig. 1. The pointer *y* also operates to regulate the supply of feedwater. A weight P, attached by a cord to the joint *e*, compels the piston to follow the mercury on its contraction. Fig. 3 shows a thermometer or pyrometer in which the relative expansion of two metal rods, attached to fixed flanges M^1, M outside and inside the steam chest, is magnified, and the temperature indicated on a graduated scale by a pointer *y* attached to the ends of the two rods. An alarm apparatus similar to that shown in Fig. 2, or the feed-regulating arrangement mentioned above, may be attached to the pointer shown in Fig. 3. The rod *d*, *c* in contact with the steam passes through a stuffing-box; but, where the rods and steam chest are of the same metal, the rod *d*, *c* is fixed to the outside of the chest. The rod *v* is then surrounded by water to keep its temperature constant. Fig. 4 shows an apparatus in which the unequal expansion of two parallel blades A, B, C, D, which are of different materials but approximately of the same length, moves a pointer K. The blades, which are connected by cross-pieces, are fixed at the ends A and C and carry a peg I which passes through a slot in the lever which operates the pointer. The pointer may be attached, as in the arrangement shown in Fig. 2, to an alarm clock and also to a feed-regulator. The above-mentioned thermometers may be used to control electrical alarms and regulating-apparatus. Fig. 5 shows the apparatus described in connection with Fig. 1 adapted for this purpose. The end of the pointer K is insulated and fitted with two silver pieces *m* and *n*, which may bear against springs *c*, *d* and *e*, *k*. These springs are connected through a bell or bells to one pole of a battery, and the pointer K is connected to the other pole. The feed-regulating apparatus is operated by an arrangement of electromagnets E, E^1 controlled by the same contact-pieces. A liquid thermometer, having one wire connected to the battery placed in the liquid, and a second wire so arranged that when the liquid rises it completes the circuit, may be employed.

1692. Sturm, S., and **Bour, H. E.** June 17.

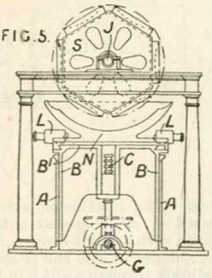
Lenses.—Figs. 1 and 3 show together a side elevation of a machine for grinding and polishing cylindrical and other lenses; Fig. 5 shows a cross-section. The glass blanks are cemented to the faces of a polygonal prism S on a shaft J coupled to a shaft J^1 driven from pulleys P. Beneath, a frame B is mounted which is vertically adjustable in a frame A by a number of screws C which may be simultaneously operated by the rotation of a shaft G geared up to each screw. The grinding is effected by a hollow cylindrical cup N which is reciprocated on the top B^1 of the frame B by a flywheel M acting through a connecting-rod L. Plates may be fixed on the faces of the prism S to increase or decrease the total number. Fig. 6 shows a modification in which the blanks are mounted on a plate M, carried by a pendulum free to oscillate about a vertically-adjustable shaft O, in a frame A^{11}. The oscillation of the pendulum is effected by a connecting-rod and crank-pin. A grinding-disc J is mounted on a shaft in bearings on a bed G, which





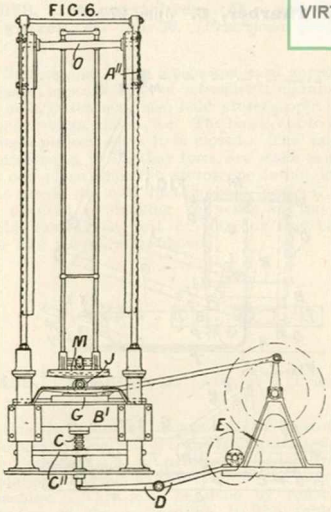
is reciprocated in a horizontal plane on guides carried by the frame B^1. The latter is adjusted vertically by a screw C and hand-wheel C^{11}. A vertical reciprocating motion may be given by a bell-crank lever D operated by an eccentric on a

FIG.5.



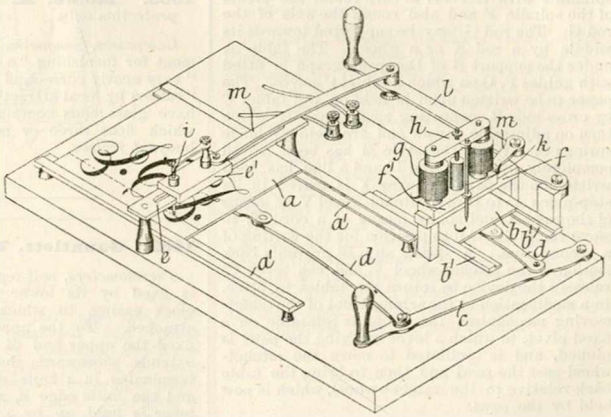
shaft E. A pinion on the shaft of the disc J engages with a fixed rack during the reciprocation of the bed G. In a further modification, the disc J is constrained to follow the arc of a circle on its being reciprocated.

FIG.6.

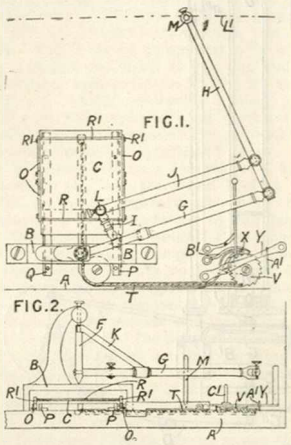


1755. Brooman, R. A., [a communication]. June 23.

Pantographs.— Relates to an apparatus for engraving, and copying designs, drawings, &c., and also applicable in carving, weaving, &c. The pattern plate *a* and the plate *b* to receive the copy of the pattern are moved in parallel guides a^1, b^1 by means of a lever *c* and links *d* which allow of enlargement or reduction in the copy. An electric conducting-style *i* and a graver &c. *k* are arranged in slides e^1, f^1, which are moved on their guides *e*, *f* by a second lever *l* and links *m*. The design on the plate *a* is rendered electrically conducting, *e.g.* by making it by removing the necessary parts of an insulating-coating on the plate *a*, so that an electric battery circuit is closed through an electromagnet *g* at the parts *i*, *a* when the style *i* is on the design. The graver *k* is carried by the electromagnet armature *h*, and is held up by a spring until the battery circuit is closed. The graver *k* may in some cases be operated indirectly from the armature *h* through suitable mechanism.

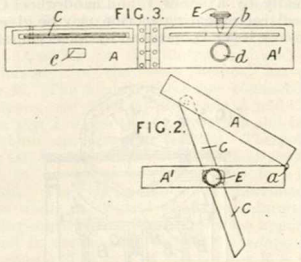


1805. Thurber, C. June 27.



Pantographs.—In a pantographic writing-appliance adapted for the production of small writing by the blind or persons with unsteady hands or without fingers &c., the rods G, H, I, J, Figs. 1 and 2, forming the pantograph and carrying the style M and pen L, are carried by a vertical spindle F with freedom to turn round the pivots of the spindle F and also round the axis of the rod G. The rod G may be supported towards its middle by a rod K or a wheel. The table A under the support B of the pantograph is fitted with guides P, Q on which a tablet C moves. The paper to be written upon is held on the tablet C by cross-rods R connecting small arms R^1 which turn on adjustable pivots and are held by blade springs O. When the style M has been moved completely over the line L^1 and a line has been written on the paper, a lever Y is moved in its stop-piece A^1 to turn a ratchet-wheel V by means of the pawl X and so, by means of a cord T, to move the tablet C into position for the writing of a second line. A spring stop B^1 prevents back motion of the ratchet-wheel V, and the lever C^1 releases the device to return the tablet to place. In a modification of the arrangement of the tablet-moving mechanism, the table is rotatable on a fixed pivot, to which a lever carrying the pawl is pinned, and is oscillated to move the ratchet-wheel past the pawl and then to bring the table back relative to the ratchet-wheel, which is now held by the pawl.

1848. Browne, T. July 2.



Clinometers.—The instrument consists of two pieces of wood A, A^1, hinged at *a*, the piece A^1 being provided with a spirit-level. A graduated metal strip C, hinged at one end to the piece A, is capable of sliding through a slit *b* in the piece A^1 when the instrument is in use, and lies within a recess formed in the piece A when the instrument is out of use. A clamping-screw E is fitted to the side of the piece A^1. To use the instrument, the piece A is placed upon the sloping surface, and the piece A^1 adjusted until level, when the angle can be read off on the graduated piece C. Slots *c*, *d* are provided in the instrument for receiving the screw E when it is not in use.

1903. Moore, R. July 8. [*Provisional protection only.*]

Compasses, magnetic.—Relates to an attachment for furnishing "a correction or an estimate "very nearly correct, of the magnetic deviations "caused by local attraction." A box which may have glass ends contains spirits of wine &c. on which float three or more magnets secured to buoyant frames.

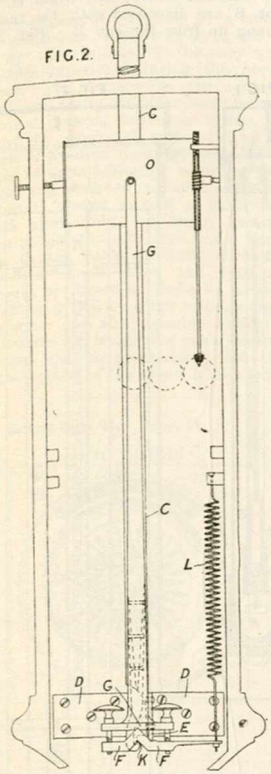
1962. Gauntlett, W. H. July 14.

Thermometers, self-registering. A zinc tube C is fixed by its lower end to a plate D, on a clock casing, to which a knife-edge E is also attached. To the upper end of the tube C is fixed the upper end of a long deal rod, which extends downwards through the tube C and terminates in a knife-edge K, between which, and the knife edge E, a lever F is held. This lever is held up by a spring L and is bolted to the base of a long arm G reaching up to and bearing against a clock-driven drum O. The expansion of the tube C rocks the lever F and plate G, thus operating the pointer scribing on the drum O.

(*For Figure see next page.*)

1962.

FIG. 2.



2056. Jackson, R. July 28.

Protectors and shades, face and like.—The disfiguring effects of small-pox and similar diseases are prevented by enclosing the faces, hands, arms, and other exposed parts of the body of the patient in protective coverings, which exclude air and, if desired, light. One form of covering for the head consists of a silk or other hood, detachably fastened round the neck and secured to a thin gutta-percha sheet provided with an elliptical opening for the mouth, a recesse opening for the nose, and glass or mica strips in the apertures for the eyes. A green silk or similar strip may be attached to the covering to exclude the light.

2078. Bauerrichter, H., and Bauerrichter, G. July 30. [*Provisional protection only.*]

Stereoscopes.—The lenses and card support are fixed at opposite ends of a frame fitting into a box or case, which may also hold stereoscopic slides, handerchiefs, gloves, &c. The box is cut to let the lenses project when it is closed. The box and stereoscope, in another form, are made to appear as one piece when the steroscope is not in use; the lenses do not, in this case, project. This is effected by making the ends of the frame hold down; the rest of the box may be used for like purposes as above.

2129. Bradley, J. Aug. 7. [*Provisional protection only.*]

Camera obscuras; magic-lantern apparatus.—Relates to a method of transferring the designs to be engraved on a printing-cylinder from an enlarged diagram to the table of the engraving-machine. This may be done by reflecting a shadow of the pattern on to the table by a strong light and a mirror. The pattern may then be traced from the shadow.

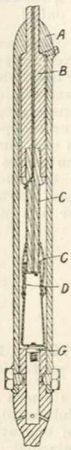
2130. Scartliff, J. R. Aug. 7. [*Provisional protection only.*]

Compasses, drawing; dividers; miners' dials.—The distance between the points of a pair of compasses is indicated on a dial placed upon the face of the shoulder of one of the limbs. The head of the other limb has one half of its periphery toothed to work in a small pinion pinned in a slot in the shoulder of the first limb. The rivet which secures the pinion carries a pointer denoting on a scale the distance between the points. The positions of the quadrant rack and pinion may be reversed. The pinion in this case drives a toothed wheel mounted upon the dial-pin between the two parts of the joint at the head of the compasses. The pointer may also be secured to the rivet which connects both parts together, and the dial placed upon the shoulder of the other limb. The invention may be applied to "mining dials" and like instruments.

2162. Benson, J. W. Aug. 13. [*Provisional protection only.*]

Eyeglasses.—Bows or handles for eyeglasses are made with a double swivel to admit of their turning round in different directions; they may be attached by screwing or otherwise.

2200. Balestrini, P. A. Aug. 19.



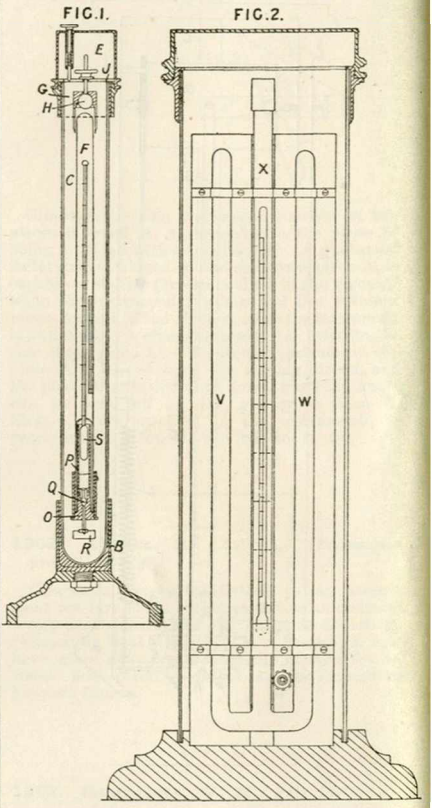
Sounding-apparatus. — Consists in the application of electricity for sounding purposes, by the use of a plummet such that on its reaching the bottom an electric circuit is made or broken and a signal at the surface thereby operated. A plummet of this kind comprises a piston B sliding within a casing A, and fitted with two insulated rings C connected to the two wires led down the centre of the piston. The circuit is normally closed by a spring D engaging the two rings C, but on the plummet reaching the bottom the piston B descends, thus breaking the circuit. The casing is filled with liquid such as oil, alcohol, &c., which is prevented from escaping by a piston G.

2218. Hall, W. K., [*Marine Velocimetre Co.*]. Aug. 21. [*Provisional protection only.*]

Logs and leeway indicators.—The speed and the leeway are indicated and recorded by a drag or flap valve which hangs from a box on the keel and takes up an inclined position depending upon the speed, while a small paddle-wheel placed transversely in the keel is actuated by the leeway. Suitable connections enable each apparatus to operate index hands, and the forward motion is recorded at intervals by means of clockwork.

2278. Cumming, G. Aug. 29.

Barometers; thermometers; hygrometers.—In the form shown in Fig. 1, the instrument is of the type in which an air tube, closed at the top, is partly immersed in a liquid. A glass tube C, of large bore, is cemented into a pedestal B, and is fitted at the top with a screw-cap E, from a plate J, in which depends a tube F closed at the top, and fitted at the bottom with a screw-plug O. An axial passage in this plug is fitted with a valve Q carried by a float R. The plug O also screws into a tube P, in which the bulb S of a thermometer is supported. The outer tube C is partly filled with coloured water which is adjusted to stand at the same level in the tube F for a barometric pressure of, say, 29 inches of mercury, and a temperature of 60° F. The rising and falling of the water column then subsequently indicates the barometric height. The dew-point is determined by calculation from the thermometer reading. In a modification, the top of the tube F is fitted with a stop-cock. For marine use, the ball-and-socket suspension H, G, and the foot B are dispensed with, the instrument being hung up from the cap E. Fig. 2 shows



a form in which a central, open-topped tube X is in communication with two sealed branches V, W. The liquid rises and falls in the central tube against a barometer scale.

2312. Godet, P. B. Sept. 4. [*Provisional protection only.*]

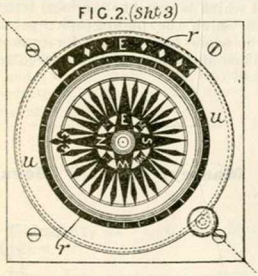
Stereoscopes.—Stereograms are mounted in an album and viewed by lenses fixed in the cover.

2366. Silver, T. Sept. 11. [*Provisional protection only.*]

Sounding-apparatus.—Relates to a method of taking continuous soundings in great ocean depths, by observations of the varying strain which cables experience during the process of paying-out. Two frameworks are arranged on the vessel, one above the other, each being fitted with grooved pulleys, sheaves or drums, and are held apart by means of springs. The bottom framework is fixed on deck, whereas the upper is capable of approaching or receding from its neighbour, and in doing so affects the springs. The cable is wound around a pulley of each framework alternately, and finally passes over the stern of the ship into the sea. Variations of strain in the cable produce corresponding variations in strain upon the framing and springs, and by recording these by means of an index, indicator dial or other suitable apparatus in the manner of a steam engine indicator, the various lengths and weights of cable suspended at any moment may be ascertained, and the contour of the bottom of the ocean delineated.

2371. Lungley, C. Sept. 11.

FIG. 2. (Sht 3)



Binnacles.—An adjustable indicator showing the officer on duty to point out the course to be steered is adapted to ships' binnacles. Above the compass card is mounted a graduated ring *r*. The ring has teeth formed on its periphery to engage with a pinion rotated by a milled head so that the indicator ring may be adjusted to any required position. The graduated ring *r* is covered by a plate *u* having an opening. An adjustable indicator, mounted in a box which may be attached to the side of the binnacle, may replace the indicator shown in Fig. 2.

2428. Dering, G. E. Sept. 18.

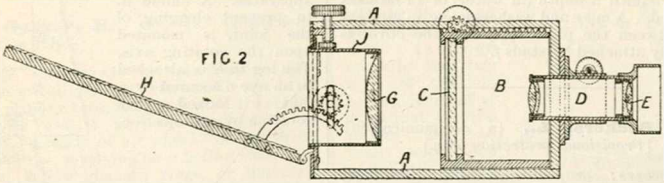
Sounding-apparatus. — Deep-water soundings necessary in laying or picking up submarine electric cables and for other purposes are obtained by the use of a self-registering instrument similar to an aneroid barometer and indicating the pressure of the water.

2446. Picot, L. F. Sept. 21. [*Provisional protection only.*]

Specific-gravity estimating-apparatus. — In a salinometer for indicating the saturation of water in marine boilers, the hydrometer rests in an inner perforated vessel, placed in an outer vessel, which is supported by, and communicates with, a hollow frame. The water from the boiler passes through a dome chamber, placed beneath the central receiving vessel to the frame. An overflow basin surrounds the outer vessel.

2459. Newton, A. V., [*Woodward, D. A.*]. Sept. 22.

FIG. 2



Camera lucidas; camera obscuras. — A box camera is arranged for projecting the image of a photographic transparency on to a surface suitable for tracing or painting. The apparatus consists of a box camera A with a focussing lens D. B is an internal focussing carrier for the transparency C. The transparency is illuminated by sunlight by means of a plano-convex lens G mounted in a rotatable sleeve J, to which the reflector H is pivoted. The reflector H and sleeve J are adjusted by racks and pinions.