

PATENTS FOR INVENTIONS.

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ABRIDGMENTS OF SPECIFICATIONS.

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CLASS 97,

PHILOSOPHICAL INSTRUMENTS,

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

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PERIOD—A.D. 1877—83.

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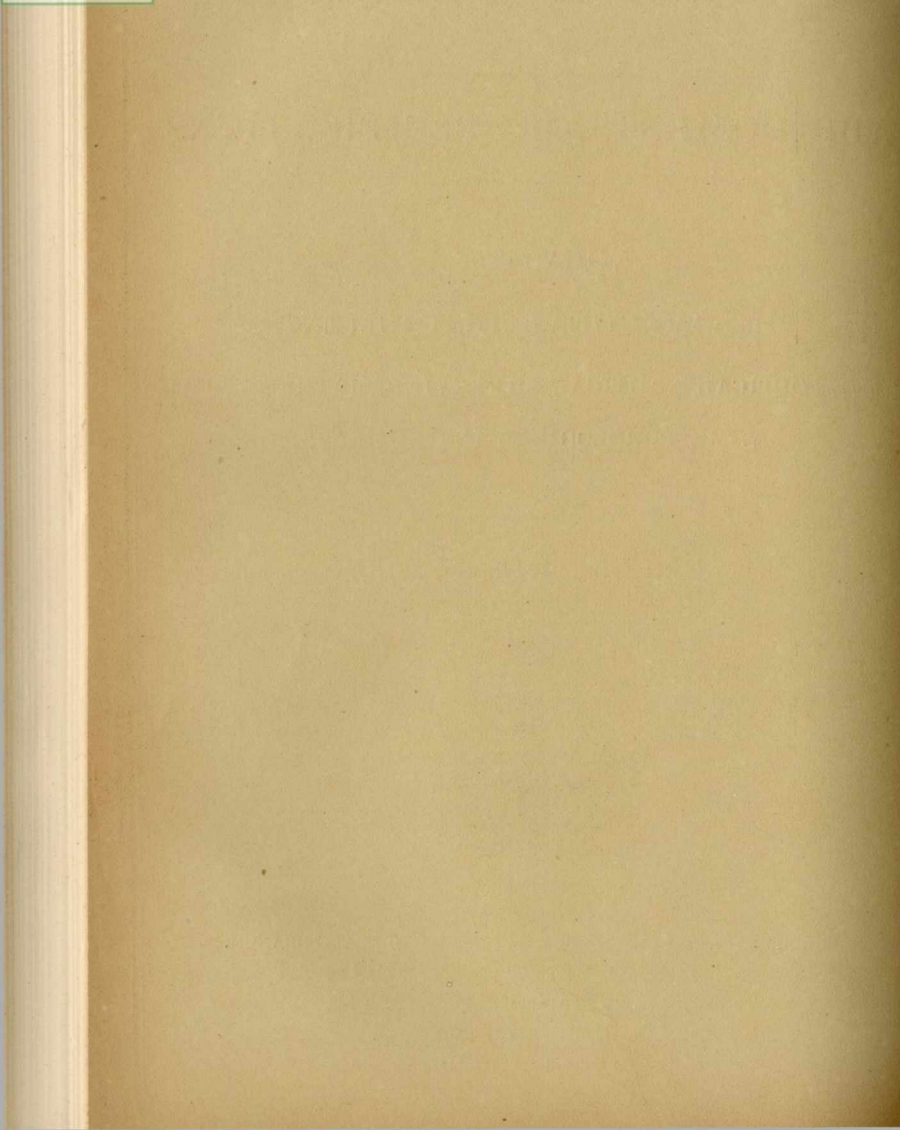
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1893.

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1893

PATENTS FOR INVENTIONS.

ARRANGEMENTS OF SPECIFICATIONS.

CLASS 37.

PHILOSOPHICAL INSTRUMENTS.

OPTICAL, MECHANICAL, AGRICULTURAL, MATHEMATICAL,

AND METEOROLOGICAL INSTRUMENTS.

PERIOD—A.D. 1875-83.



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1883



## 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, and for a list (with prices) of the Abridgment Classes for the period A.D. 1877-83, reference should be made to the *Abridgment-Class and Index Key*, published at the Patent Office Sale Branch, 38, Cursitor Street, Chancery Lane, E.C., price One Shilling, postage (parcel post) Sixpence.

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 Eightpence, may be purchased at the Patent Office Sale Branch, or ordered by post on the Patents Form C<sup>1</sup> (to be obtained from any Post Office), no additional charge being made for postage.

## SUBJECT-MATTER INDEX.

Abridgments are printed in the chronological order of the Specifications to which they refer, and this index quotes only the year and number of each Specification.

- Achromatic lenses. *See* Lenses.
- Actinometers. *See* Photometers &c.
- Advertising, Optical lanterns for. *See* Magic lanterns &c.
- Air-current meters. *See* Anemometers.
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- "Angles" or set-squares. *See* Squares, Drawing &c.
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*for which see those headings.*  
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*for which see those headings.*  
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# PHILOSOPHICAL INSTRUMENTS,

[including OPTICAL, NAUTICAL, SURVEYING, MATHEMATICAL, AND METEOROLOGICAL INSTRUMENTS].

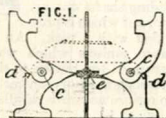
Patents have been granted in all cases, unless otherwise stated. Drawings accompany the Specification where the abridgment is illustrated and also where the words *Drawings to Specification* follow the date.

A.D. 1877.

**28. Poznainski, D.** Ján. 2.

*Tripod stands.*—Relates to folding stands in which the parts are stamped out of sheet metal. Each branch is in two parts, riveted or jointed at *c*. A lip *d*, or a stud, may act as a stop for the upper parts or arms when the stand is in use. *e* is an ordinary central pivot by which the stand may be folded flat, and the joints *c* enable it to be folded into still smaller compass.

Abridged also in *Classes Lamps &c.; Photography; Stoves &c.*



unequally. In this arrangement the fluid chamber is filled with oil or other fluid, and the same fluid rises in both the gauge tube and the open tube.

**115. Wolochoff, A. D.** Jan. 10.

[Provisional protection only.]

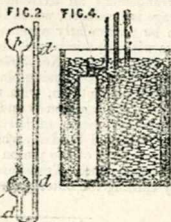
*Scales on glass tubes.*—Relates to the marking of scales on glass tubes in such a manner that they will remain permanently. The tubes used have an exterior surface of enamelled or coloured glass on which the divisions &c. are etched &c., so that they will be transparent against a coloured background, or *vice versa*. A clear glass tube may be painted over with coloured soluble glass and the same results produced.

*Thermometers.*—When the stem of a thermometer is enclosed in a glass tube carrying the scale, the divisions &c. may be painted on the said tube with coloured soluble glass and then burnt, or the etchings may be filled with coloured glass and burnt.

Abridged also in *Class Pipes &c.*

**88. Lowne, R. M.** Jan. 9.

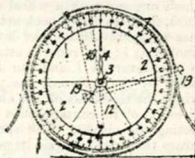
*Barometers.*—Relates to means for automatically compensating for changes of temperature in mercurial and other fluid barometers of a similar character to those known as sympiesometers. In one form, an additional and lower bulb or chamber is provided, filled with suitable fluid which rises into the gauge tube and is supported by a column of mercury in the open tube. An alteration of temperature which produces expansion of air in the bulb of ordinary sympiesometers acts on the fluid in the lower bulb which, also expanding, forces the mercury or other fluid higher in the open tube. This form is shown in Fig. 2, in which *b* is the air-chamber, *c* that containing oil or other fluid, and *d* the open tube with the supporting column of mercury. The scale is fixed between *b* and *c*. Fig. 4 shows another form, with the air and fluid chambers placed side by side and immersed in a cistern or chamber, by which rapid changes of temperature are prevented from affecting the two chambers



**139. Barrey, H. G.** Jan. 11.

*Level and clinometer.*

—In an inner case is fixed a dial 2. On a tapered pivot 3 projecting from an outer case is a weighted indicator 12 with pointers 4, glass washers being fitted to keep the indicator in position. The weight 12 is of some non-magnetic metal, and is covered at the back so that the dial will not be scratched. When not in use the weight 12 is pressed against the glass front by a spring 16, which may be held back by a key 19. The double case enables the dial to be adjusted, the inner case being able to turn in the outer. The stocks may have sight holes from end to end. In a modification, the dial is semicircular and there is only one pointer. In another modification, there are three faces for applying the apparatus, two at right angles and a





third at  $45^\circ$ ; in this case the indicator only moves through a small angle.

*Squares.*—This last modification may be used as a square.

Abridged also in Class *Fire-arms &c.*, Div. I.

**140. May, J. M.** Jan. 11.

*Glass cases for barometers, thermometers, &c.*—The cases are made of blown glass instead of pressed glass, to facilitate ornamenting. The glass may be blown into moulds of wood or metal, or it may be shaped by hand. An opening formed by hand or by the moulding is cut in any desired position to receive the clockwork or other mechanism.

Abridged also in Classes *Boxes &c.*; *Glass*; *Watches &c.*

**143. West, H. J.** Jan. 11. *Drawings to Specification.*

*Combined thermometer and vacuum gauge for freezing-apparatus.* The instruments are placed under a strong glass casing and screwed into the exhaust pipe, into which the protected thermometer bulb projects.

Abridged also in Classes *Air and gases, Compressing &c.*; *Cooling &c.*; *Steam engines.*

**237. Thurel, F. N.** Jan. 18.

*Eye-protector.*—For protecting the eyes after an operation, for use in ophthalmia or inflammation, and for keeping on dressings &c. Two pieces of suitable metal *a*, preferably of zinc on account of its curvative effect, are shaped to follow the form of the eyes, and are held in position by an elastic or other band *c* passing through rings *b* on the plates *a*.

Abridged also in Class *Medicine &c.*



FIG. 1. FIG. 3.

**421. Clark, A. M.**, [Haines, J. P.]. Jan. 31.

*Logs, electric.*—The upper journal *a* of the screw *A* projects into the chamber *d* attached to the vane *B*, and is provided with a screw *g* which engages with a wheel *e*. A pin *h*, fixed to the wheel, actuates once every revolution the lever *f*, pivoted at *i*; the rod *k* is attached to the lever at *l* and, on being raised by the action of the pin *h*, brings the terminals of the electric wires *o*, *o'* in contact, thus completing the circuit. The spring *j* causes the lever to regain its normal position, when freed from the pin *h*, thus breaking the circuit. The rod *k* passes through a flexible diaphragm *m* which separates the chamber *d* from the upper chamber and is clamped by a screw joint; clamping discs *n*, *n* are provided to prevent the access of water to the upper chamber; the stuffing-box *p*, through which the collar passes, serves the same purpose. The conducting-wires are connected with

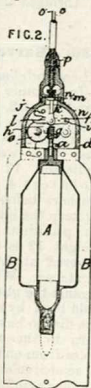


FIG. 2.

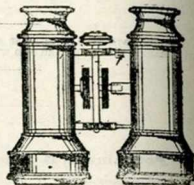
an electromagnetic recording apparatus. A single wire may be used, the return current passing through the water. The log may be used to indicate the velocity of streams or currents of water.

Abridged also in Class *Electricity &c.*, Div. III.

**442. Moreau, C.** Feb. 2.

*Opera &c. glasses.*

—Relates to mechanism for adjusting the distance between the two glasses, more especially those which are long-sighted. The two barrels are connected by three hollow bars or more pinions which work in the racks, and by turning a top button to the right or left the glasses are separated or contracted. Means are provided to ensure accurate parallelism.



**496. Wenham, F. H.** Feb. 6.

*Microscopes.*—Relates to an object stage having only one traversing-plate, to which motion is imparted, in directions at right angles, by means of two milled heads on the same axis. By this arrangement an extremely thin stage is produced, which is stated to be particularly applicable for use with the microscope described in Specification No. 3078, A.D. 1876. The traversing-plate *F* is moved to and fro, with respect to the transverse slide *C*, by a pinion *G* and racks *H*. The pinion is turned by means of the inner milled head *I*, the outer milled head *K*, which acts as a nut on the screwed end of the pinion spindle, being turned at the same time. Transverse movement is obtained by turning the outer milled head alone.

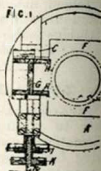


FIG. 1.

**525. Marx, W.** Feb. 7.

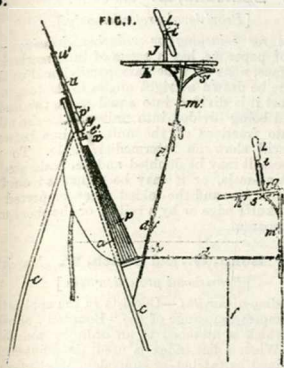
*Magnifying-glass.*—A portfolio having a movable front with arrangements for unfolding and supporting the same is combined with an easel and adjustable magnifying-glass. The magnifying-glass *L* is carried on a ring *j* upon a bar *k'* which may be inclined backwards or forwards on the axle *g* at the top of the rod *m'* which is fitted to the cover *d*. A groove in *k'* allows the glass to be moved forwards or backwards.

Abridged also in Classes *Artists' instruments &c.*; *Furniture &c.*; *Writing-instruments &c.*

(For drawing see next page.)



525.



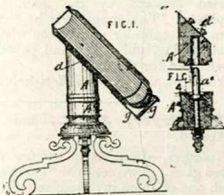
with elastic bands radiating from the joint B. A double instrument is formed by the union of two

539. Hasler, G. A., [Lehmann, H., partly].  
Feb. 8.

Stands for holding photographic albums, ladies' companions, portfolios, and other like articles. The upper part A holds the article in an oblique position and fits on

to a vertical spindle  $a^x$ , secured to the lower part  $A^x$ , on which it is free to revolve with the article attached thereto. For attaching the article to the stand, a plate  $d$  carrying studs is fastened to the upper part of the stand; the studs engage in slots in the underside of the article. Angle-pieces  $g$  are fitted to the article to prevent undue strain when it is opened.

Abrided also in *Classes Books; Furniture &c.; Photography; Sewing &c.; Trunks &c.; Writing-instruments &c.*



545. Harriss-Gastrell, J. P., [Mouton, E.].  
Feb. 8.

*Measuring and drawing proportionate distances.*—The instrument, which is capable of measuring, transferring, reducing, enlarging, and drawing proportionate distances, is either simple or double in measuring or double in reducing or enlarging, or double in both ways, and therefore quadruple. Fig. 1 shows a simple instrument. Equal arms  $A B$ , and  $B C$  are pivoted at  $B$ , and equal arms  $H D$  and  $D G$  are pivoted together and to the arms  $A B$  and  $B C$ . A graduated bar  $D E$  with a handle works in a slide and moves the bars. Centered on these bars are wires which end in the hypotenuse  $A C$ . In another form these wires are replaced by lazy-tongs at the hypotenuse,

such simple instruments at right angles to each other and having the bar  $D E$  common to both. Three or more simple instruments combined together produce multiple forms. Fig. 3 shows an instrument with adjustable bars to measure unequal distances. The bars  $A B C$  and  $G D H$  with the bar  $D E$  are the skeleton of Fig. 1. The bars  $L N$  and  $A H$  are parallel and have sliding on them blocks pivoted to bars as shown. In the double instrument formed by the union of two simple instruments, Fig. 1, by substituting bars arranged to carry wires at right angles to the plane of each triangle, a trellis-work expanding from a central set of squares to the boundary of the square of the hypotenuse stretch is obtained. The wires of this trellis-work slide in rings and may be set to contours. Fig. 7 shows a multiple parallel ruler for drawing equidistant parallel lines, in which sliding rods are held in revolving rings on the crossed levers at equal distances from the centre of the intersection  $I$  and in oblong blocks sliding in a slot of the bar  $A C$ .

617. Gray, T., and Gray, J. Mc. F.  
Feb. 14.

[Provisional protection only.]

*Spectacles, binoculars, &c. for viewing coloured signal lights.*—These are constructed with green and red glasses, each coloured glass allowing a similar coloured light to be seen but obscuring other colours, except white. The coloured glasses can be thrown out of use when desired, by revolving on an axis or running in a slide. Each instrument may be provided with one or a pair of each colour. Special peculiarity of form marks red from green, and where the two colours are combined in one instrument it is arranged that the same colour is always presented to the same eye. The invention is designed to assist all eyes, as well as to obviate and detect colour-blindness.

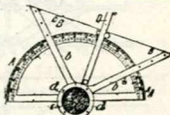
- 718. Negretti, H. A. L., and Zambra, J. W.** Feb. 21.

[Provisional protection only.]

*Thermometers, hygrometers, &c.*—To protect the figures when marked upon the capillary tube itself, the tube is enclosed within another tube or cylinder, the bulb being left exposed beyond the end of the covering-tube. The tubes are welded together, instead of being secured by cement, to obtain an airtight joint.

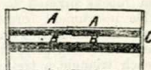
- 802. Murray, D.** Feb. 28.

*Laying off and measuring courses &c. on charts and plans.*—Around the centre *c* of a graduated arc *A* moves a frame consisting of two bars *b, b* fixed at right angles. *B* is a plate, *D* is a graduated flexible band or tape of steel &c., and *d* is a transparent centre disc with cross lines. To set out the true course of a ship on a chart, the instrument is first used to draw a line through the position of the ship making an angle with the meridian equal to the magnetic correction for the place. The centre *c* is put over the position with the straight edge of *A* in this line, and one of the edges *b* is set to the angle of the compass reading. A line drawn along this edge will represent the true course. The distance to any point on this line may be measured by the band *D*.



- 901. Heyer, H.** March 6.

*Ruler.*—The figure shows this appliance as seen from its under side. It consists of an outer portion *A* of wood, metal, or other material, and of a roller *B*. The part *A* is by preference curved, but may be of a triangular or other figure. In the under part is formed a recess, wherein the roller rotates on end pivots which pass through and rotate freely in metal caps *C* on the ends of the cover. The front edge is the ruling-line, the roller being underneath the cover, and thus the front edge cannot come into contact with the paper or other flat surface.



- 938. Woodruff, W. T.** March 8.

[Provisional protection only.]

*Telescopes and other optical instruments* have a shutter for the eye-pieces formed of an annular cap, fitted to rotate, and retained in position by pins taking under a shoulder. Within the cap is pivoted by one end a plate curved to leave a free opening through the cap when the plate is moved to one side. A stud engages in a radial slot in the free end of the plate, so that on partly rotating the cap (which carries with it the pivoted end of the plate) the plate will cover or uncover the opening in the cap.

Abridged also in *Classes Fuel, Manufacture of; Lamps &c.; Preparing &c. cork &c.; Tobacco; Writing-instruments &c.*

- 1086. Sharland, R.** March 17.

[Provisional protection only.]

*Scale for enlarging or reducing drawings.*—A sheet of paper &c. has a series of lines marked on its surface, none of which are parallel, and so that if a line be drawn at right angles to the length of the sheet it is divided into equal parts, the line at one end being divided into units and at the other end into fractions of the unit. A line between these will show an intermediate scale. To use this sheet, it may be doubled and the scale used as a plotting-scale, or it may be supported on two rollers in a box and the folded sheet supported by a blunt knife edge or by a roller; or the sheet may be transparent.

- 1105. Bohn, G., and Smith, W.** March 20.

[Provisional protection only.]

*Sounding-apparatus.*—Consists in the application of a compression gauge of the "Bourdon" or other type, which is attached to an ordinary sounding-lead. When a dial index is used, the pointer may be retained by ratchet or equivalent mechanism to indicate the maximum pressure and, consequently, the depth, means being provided to release it and return it to zero; or a second free moving hand, carried forward by the main index, may be employed. The gauge may be constructed in the form of a cylinder and piston with air cushion or metal spring, and a slot and pointer may then be substituted for the dial.

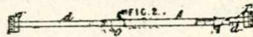
Abridged also in *Class Registering &c.*

- 1339. Cryer, J. W., and Button, G.** April 6.

*Reflectors.*—Consists in the use of corrugated or fluted glass. Two cones or "octagon cones" may be used, one of them inverted and the other with the reflecting-surface on the inside, the light being between them. Oblong reflectors are used with lights for inside and outside shop windows, counters, billiard tables, &c. The method of adaptation to churches, theatres, &c., and to street and other lamps is described.

Abridged also in *Class Lamps &c.*

- 1501. Vetch, G. A.** April 18.



*Measuring distances.*—A distant horizontal scale is used in connection with a theodolite &c., which is turned through a definite angle, the readings of the scale giving the distance; or a base of constant length may be used and the angle measured. A rod *A* is placed on a tripod &c. at right angles to a line joining the two stations, hinged sights on the rod being used for this purpose. The zero line *o* is sighted through the telescope, and then the latter is turned through a definite angle and the distance read on the scale. For long distances the angle may be halved &c. and the reading doubled &c. For another method with a base of constant length, the scale *A* is made hollow, and in it slide rods *d, d* with folding pieces *T, T'*. The telescope is sighted first at one

piece and then the other, and the angle turned-through noted, special tables being then consulted. In a modification, on the top of the scale are holes opposite the graduations, into which holes pieces are put when the graduations can only be indistinctly seen. Also the parts *d, d* are hinged to and fold on *A*. The parts *T, T'* are pivoted on the ends of *d, d*, about which they turn to be folded in. On the back is a scale used for short distances when the whole is folded up.

1512. **Syré, A.** April 18.

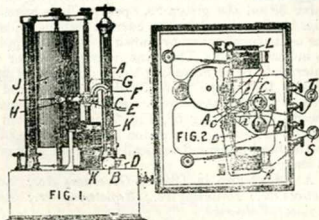
[Provisional protection only.]

*Drawing apparatus* for drawing straight, curved, spiral, or radial lines, hatching or sectioning, and also applicable for engraving steel or copper plates. In the arrangement shown in Fig. 1, the graduated straight-edge *A* is provided with an eye *a* to receive a screw centre upon which the rule pivots in drawing radial lines, and a cross-piece for reckoning minute subdivisions. This straight-edge may be replaced by a curve for drawing curved lines, and is pivoted to the sliding head *B* at *b*, which is also the centre of a protractor attached to the rule *A*. The said head *B* consists of the bars *d, d* connected by cross-pieces *h, f, g*, receiving between them the slide *e*. A diagonal scale engraved on the slide *e* and cross-piece *h* serves for regulating the spacing of the lines. The apparatus is shifted the distance of a line by the bell-crank lever key *k*, which, when depressed, bears by its vertical arm, carrying the cross pin *u*, against studs *O* of the guides *d* and moves the latter. The screw *m* is provided to regulate the extent of motion, and the lever is returned to position by a spring. India-rubber strips are applied to the under surface of the parts *d, d*, and *e* to allow of their alternately adhering to the surface upon which they are placed. For use upon, and engraving, hard substances a diamond point is fixed to the rule by means of an upright. In a simplified form for ruling parallel lines only, the pivoted joint *b* is dispensed with.

1639. **Bonneville, H. A.**, [Boyle, R. K.] April 26.

*Thermometers, barometers, hygrometers, &c., self-recording.*—The tube *A*, which contains the column of mercury the variations of which are to be recorded, is enclosed in an open metallic case *C* resting on an insulated support *D*, and is made up of alternate layers of metal and india-rubber or other insulating material. A brush *E*, in two parts insulated from each other, one of which bears on the casing *C* and the other on the tube *A*, is secured to a head *F* working on a screw spindle *G*. An arm *H* bearing up a pencil *I* bears upon a sheet of paper

or other suitable material stretched on a drum *J*. On the screw spindle *G* is mounted a



ratchet-wheel *c*, which is exposed to the action of two pawls *d, e* acting in opposite directions and connected with the armatures of two electromagnets *K, L* respectively, as shown in Fig. 2, which further shows the electrical connections in the circuit of the batteries *S, T*. According as the mercury falls or rises, the pawl *d* or *e* is actuated and the brush *E* lowered or raised, the pencil following the variations in height of the mercury and marking the same on the recording-drum.

*Sea thermometer.*—In a recording-apparatus for taking the temperature at various depths of the sea, the electrical contact between the brush *E* and the metallic plates in the tube *A*, and so with the mercury, is made by means of fingers coming in contact with projections on the metallic plates. The casing itself is of copper and zinc plates, and when the instrument is lowered into salt-water a galvanic action is set up on the circuit being completed. The temperature is recorded in the same way as above described.

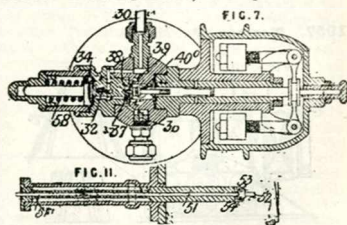
Abridged also in Class *Electricity &c.*, Div. III.

1655. **Adkins, J.** April 28.

[Provisional protection only.]

*Magnetic compasses.*—To prevent vibration of the card, the pin passes through the top of a small half ball or balls. A number of balls are also suspended from the card.

1656. **Westinghouse, G.** April 28.



*Logs and current indicators.*—The speed of a vessel or current is indicated by the fluctuations of pressure of a liquid in a chamber 37, Fig. 7,

connected at 30 to a suitable indicator. The liquid is supplied at a constant pressure in any convenient way, and the fluctuations are caused by the escape valve 38 on the piston 39, operated by a vane 52, Fig. 11, (immersed in the current) which replaces the centrifugal governor shown in Fig. 7 as applied to indicate speed. The vane acting on either the fulcrum 53 or 54, according to the direction of flow, presses the escape valve 39 down by the rod 51 with a variable pressure according to the variable speed. The spring 58, Fig. 7, is constructed to exert a pressure on the piston 34 equal to that due to the head measured vertically from the apparatus to the gauge.

Abridged also in Classes *Governors &c.*; *Locomotives &c.*; *Railways &c.*; *Registering &c.*; *Steam engines*; *Valves &c.*

**1713. Heath, G. W.** May 2. *Drawings to Specification.*

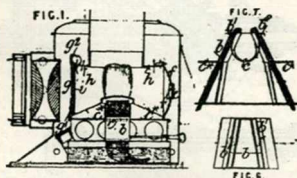
*Sextants, scales for.*—Constructed to prevent their being affected by changes in temperature and to be easily renewed. An arc of hard wood is fixed in a deep trough-shaped groove in the metal arc of the sextant, by means of wood-screws passing through the metal arc. Embedded and cemented in this wooden arc is the scale of ivory &c. The vernier is fixed in the index by two screws.

**1716. MacDonald, A. S. L.** May 3.

*Thermometers and pyrometers.*—A reservoir (which is put in the fire &c.) is connected to a pressure gauge, preferably a Bourdon gauge. If the reservoir is made of fragile material it is protected by a metal covering having holes in it. Part of the connecting tube, either straight or as a worm, may be immersed in a bath of water. The gauge may be also immersed in a bath. Mechanism may be fitted to register the maximum and minimum temperatures. The reservoir is filled with air &c. at a pressure depending on the range of temperature the instrument is to be used at. The instrument is graduated by calculation or by experiment, or both.

*Pyrometer for blast furnace.*—The reservoir contains nitrogen and is a long narrow iron or steel tube. In the same piece is an iron tube connected to a pressure gauge.

**1957. Newton, F.** May 18.



*Magic lanterns.*—Relates to lamps having the burner enclosed in a chamber with a glass front,

while a reflector replaces the usual glass back, and also to means for keeping the condensers &c. cool.

*Reflector and glass front.*—A hinged reflector *f* replaces the usual glass back; *f'* is an eye-hole fitted with glass &c. The glass front *g* is held by clips *g'*, *g''*, and is fitted with a projecting flange *i* to prevent the flame striking the glass.

*Wick holder.*—This is double, the two parts being placed at an angle. A flange *b'*, Figs. 6 and 7, protects the flame from air currents.

*Condensers.*—The socket is formed with an annular perforated space round which air circulates.

*Doors.*—There are side doors when oxy-hydrogen light is used.

*Material of lamp.*—In the Provisional Specification it is stated that to prevent oxidation of the sheet iron of the lamp it is coated with copper &c. by electrode position.

Abridged also in Classes *Lamps &c.*; *Toys &c.*

**1961. Wollen, P. O'H. B.,** [Hahn, A., and Hahn, R.] May 18.

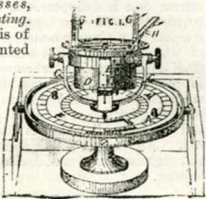
*Range-finder.*—A pair of instruments at ends of a known base are used, each having two telescopes, one of which is pointed to the other instrument, and the second to the distant object. The difference of readings (giving the angle subtended by the object) serves to determine the distance. Fig. 1 shows in plan one of the instruments; Fig. 8 the stand. The tripod stand A supports a horizontal arc which is held to the top plate of the tripod by a screw rod and a spiral spring. Into the tripod tightly fits a double conical axis to which is fixed a tri-lobed plate *a*. The horizontal sighting is adjusted by a micrometer arm *c* and screw *h*. Screws *w* are for vertical adjustment. To the plate *a* a frame B, Fig. 1, is fixed. A telescope M with tangent scale is used for sighting the other instrument. On it slides a vernier N with support S. A rule *c'* centred at *a* has a rod sliding in it, which rod is attached by a pivot to the vernier N. A telescope V for sighting the distant object is mounted on trunnions T, T' on the rule C' and supported by rollers, on arms R, resting on an arc O. The telescope V can be slightly elevated or depressed. From the stand plumb-lines are suspended. A base is measured by a tape or by use of one of the instruments and a short base. With the same base, which may be fixed by flagstones &c. in forts, or ships, &c., the distance of objects included in a large angle may be determined.

*Surveying-instruments.*—The instrument may be used for coast surveying from on board ships and also for levelling; also, according to the Provisional Specification, as a theodolite, by putting a height circle or vertical tangent measure with vernier on the telescope.

**2041. Frasi, F., and Goodsall, W.** May 25.

*Magnetic compasses, correcting and adjusting.*

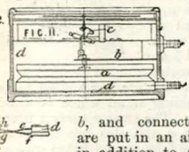
—On the vertical axis of the compass is mounted a frame C with a horizontal axis carrying a box D containing clockwork, the axis of which, at any known latitude, is brought parallel to the earth's axis by a quadrant E.



The clock face is graduated in hours. On the axis of the clockwork is a frame with a gnomon frame G, or a mirror H. The apparatus can thus be adjusted once for all for the same heavenly body. The meridian is found and compared with the reading of the compass card. In a modification, D is fixed and the clock face adjustable above by a quadrant, the gnomon frame being worked by bevel-wheels.

**2065. Budenberg, A., and Hunter, F.** [Schäfer, B. A., and Budenberg, C. F.]. May 29.

FIG. 12.



*Currents, recording speed of.*

—A blast pressure gauge, known as Broadbent's, is used, the bellows *a*, Fig. 11, spring *b*, and connections *c* of which are put in an airtight case *d* and, in addition to the usual pipe *f*,

another pipe *e* is added. Using the tube *e* alone it acts as a pressure gauge, or *f* alone as a vacuum gauge, and both together as a differential gauge. In applying this gauge to determine the speed of currents, the pipes *e* and *f* must be connected with nozzles disposed as shown in Fig. 12, so that the current blows into the nozzle *g* and exercises an exhausting action on the nozzle *h*. The dial is marked with two scales, one showing pressure or vacuum in inches of water, and the other the corresponding velocity.

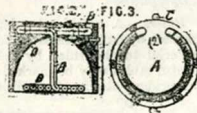
Abridged also in Classes *Electricity &c., Div. III.; Registering &c.*

**2122. Hyne, R. H.** May 31. *Drawings to Specification.*

*Binnacles.*—To neutralize the magnetic influences of the ship the bowl and cover are made of vulcanite &c. The foot-plate and pedestal are covered with an external coating of vulcanite &c. To strengthen the pedestal there is a central tube or rod fixed to the foot-plate.

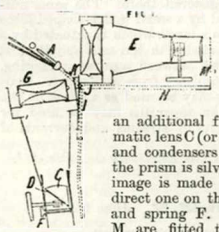
**2182. Granville, J. M.** June 5.

*Clinical thermometers.*—A coiled mercury tube B is enclosed in an inverted cup A having an insulating or radiating lining D, or there may be an



insulating-layer outside, or both inside and outside. Fig. 3 shows the scale, which is visible through the top of the cup. C are pieces by which the instrument is attached to the patient by elastic bands &c. Abridged also in Class *Medicine &c.*

**2241. Keevil, H.** June 8.



*Magic lanterns.*—Relates to dissolving-view apparatus in which only one lantern need be used. The body is fitted with

an additional front having a prismatic lens C (or a mirror with a lens) and condensers G. The face D of the prism is silvered. The reflected image is made to register with the direct one on the screen by a screw and spring F. Dissolving-shutters M are fitted to the arms of a

lever I, N. Abridged also in Classes *Lamps &c.; Toys &c.*

**2272. Fauvel, G.** June 11.

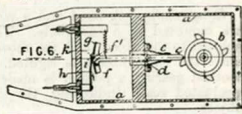
[Provisional protection only.]

*Spectacles.*—Applying voltaic electricity locally by means of spectacles. The part of the frame that is in contact with the nose carries a tubular band of zinc, which contains in its hollow channel a band of copper.

Abridged also in Classes *Electricity &c., Div. I.; Medicine &c.*

**2292. Kelway, C. E.** June 12. *Disclaimer.*

*Logs, electric.*—The improvements are specially applicable to the log described in Specification No. 1455, A.D. 1876. A tube passes through the bottom of the ship, preferably near the keel, provided with an internal flange and vertical guides on which the log case slides; the lower part of the tube is open to admit of the rotator passing into the water. The rotator, the axis of which is preferably parallel with the keel of the ship, is provided with a framework or a horizontal tube open at back and front to direct the water and prevent fouling. It is preferably circular in form, while its axis is made spherical or nearly so, to throw the water to the circumference of the blades. To stop the action of the rotator if the ship move astern, the rotator and the driving-axis may be fitted with clutches which can be disengaged when required. Fig. 6 shows an apparatus to reduce the expenditure of electricity, which passes through the insulated wires when contact is made. *a* is the case of the log containing the wheel *b* driven by the "mile" spindle; *c* is a lever actuated at intervals by the wheel *b* and turning upon the centre *d* in the water-tight joint *e*. The inner end of the lever has a segment *f*, the two extremities



of which are covered with ivory or ebonite at  $g$  and  $h$ , the intermediate part  $f^1$  being of metal. The spring  $i$  presses against the segment  $f$  and, when the lever is moved by the wheel  $b$ , the spring  $i$  is lifted by the hinged projection  $k$ . In this way a short electric contact is made, which is conveyed to the electromagnetic recording-apparatus on deck, and a unit of distance registered there. The same purpose may be secured by a small wedge-shaped piece of metal attached to a lever, which is actuated by a ratchet-wheel connected with the mile spindle, and makes electric contact between a screw and spring, both of which are insulated from each other. Dials attached to the log may be used as a check on the electric record. The apparatus may be used for recording the velocity of streams and currents of water.

Abridged also in Class *Electricity &c.*, Div. III.

**2299. Coustant, M. V.** June 13.

[Provisional protection only.]

*Ellipsograph*.—Two rules worked by rack and pinion slide at right-angles in a frame. On each rule is a vertical standard with a vertical joint surmounted by a clip. In one clip is a pinion, gearing with a rack on a rod passing through the standards, and on this rod the pencil point is clamped. One of the standards is jointed to a piece sliding along the rule by means of a screw, which adjusts for one axis of the ellipse. The tracing-point is adjusted for the other axis.

**2319. Mauthé, H.** June 14.

[Provisional protection only.]

*Range-finder*.—A fixed and a movable telescope are mounted on a base-plate. The fixed one is pointed to the object and the movable one turned until the same object is sighted. By means of toothed gearing, a pointer is made to move over a graduated scale, indicating the distance of the object.

**2398. Maxfield, J., and Maxfield, J.** June 20.

[Provisional protection only.]

*Stands for cooking vessels &c.*—The legs are hinged on a ring, and are provided at one end with a "hook-like projection," the points of which, when it is desired to set the stand up, are fixed in a circular groove at the bottom of the vessel, and are said to be held there by the elasticity of the hinges. To pack the stand, the legs are turned into a position in which they are parallel with the plane of the ring.

Abridged also in Classes *Cooking &c.*; *Photography*.

**2453. Wirth, F.,** [*Paschwitz, E. von, and Paschwitz, C. von*]. June 25.

[Provisional protection only.]

*Telemeter*.—Before the telescope, and covering half the object glass, is a mirror to diverge the

rays of light at an angle less than 90°. In the mirror case is a diopter, the aiming line of which covers that of the angle mirror. The latter consists of a plano-convex lens, on the convex side of which is a small flat surface. Near the object glass is a semicircular compensating-lens. Two supports are used, some distance apart, and a measuring-rod about one metre long. A compensating-implement consists of a sighting-rod and a brass rail which is fixed to the measuring-rod. An aiming table slides on the measuring and sighting rods and has a vertical line and a pointer.

**2532. Bogen, F.** June 30.

*Barometers, portable.*

—Into the open end of the long leg  $a$ , Fig. 1, of the siphon fits a perforated glass stopper to facilitate the filling of the tube with mercury. When full the open end is fitted into the bend of the short leg  $b$ . For cleaning the tube  $a$ , a rod with a central air hole at its upper end is used. Both  $a$  and  $b$  are of the same diameter.

The instrument is supported on a pivot resting on the bed  $e$  of a folding stand which is fitted with levelling-screws  $f$ . The arms  $g$  carry a ring which supports the tube  $a$  and also two thermometers. The leg  $b$  is covered by a cap  $i$  fitted with a screw and indicator  $z$ . For reading the height of the mercury in  $a$ , a cylinder slides over wide graduations on  $a$ . This cylinder has two opposite slots, on the sides of which are strips of silver plate graduated on both sides. This form of tube may be used for indoors. The scales are read by lenses to which are fixed paper discs, white or light green in colour, with peculiar holes in their centre.

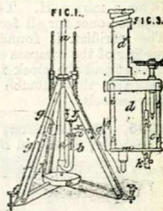
*Barometer cisterns*.—The glass cistern  $A$ , Fig. 3, is held together by iron bands  $i$  and fitted with an iron bottom. The lid is screwed against a block of wood  $d$  which fits closely into  $A$ . The mercury in  $c$  is connected to the long tube of the barometer by a channel at the lower end of  $d$ . A cylinder  $d^1$  into which a ring  $e$  fits raises the long leg from the bottom  $m$ . An overflow  $k$  is provided, which, when pushed up into  $A$  and filled with calcium chloride, serves as an air hole. The heights of the mercury are indicated as described above.

Abridged also in Class *Photography*.

**2559. Roberts, M.** July 4. *Drawings to Specification.*

*Rulers*.—A combined ruler and slate-cleaner is formed by fixing strips of felt or other absorbent material to the ruler by means of pins or wire. Useful tables may be marked on the rulers.

Abridged also in Class *Writing-instruments &c.*



2796. **Mewburn, J. C.**, [*Jaquemier, W. J. R.*]. July 5.

*Ships' logs; current meters; anemometers.*—Motion is given for a time (fixed by a clock movement) to the indicating-mechanism by the shaft of which the speed is to be measured. This motion is imparted to a wheel B, Fig. 1, through an external lever A, Fig. 3, and a click. The motion of B is transmitted through the pinion E and wheel F to a hand carrying a ratchet-wheel D on an arbor O. The wheels B and D are held by pawls H and I. A lever G is fixed on the wheel F and acts on a pin *a* on the wheel D. The apparatus being put in action, as soon as the fixed time has elapsed a pin (on the clock movement) strikes a lever *c* and lifts the stop click H, when the escapement moves the click from the wheel B by levers *h, h'*. The wheel B is returned to zero by a spring *r* and toothed arc *d*. Its return travel is limited by a pin on the wheel F coming in contact with a pin on the disc P which supports the mechanism. During the return the wheel D remains stationary and the hand *k* indicates the number of revolutions made in the unit of time. After a fixed interval the escapement again allows the click to act on the wheel B, and if in the next unit of time a greater number of turns are made the hand *k* is advanced farther; if the speed has diminished during this unit, some instants before the release of the wheel B, a pin *b'* (on the clock movement) will, through a lever *c'*, release the click I, when the wheel D will be returned by a spring *r'* and toothed arc *d'* until its pin *a* comes against the lever G on the wheel F and at the end of the unit of time the hand *k* will indicate the number of turns made. Thus the speed for each recurring unit of time is shown. When only occasional trials are to be made the mechanism may be simplified by releasing the stop click H by a finger button. The lever and click may be replaced by other engaging-devices, or the ratchet-wheels can be connected by an epicycloidal train. The indications of the hand can be registered by a pencil attached to a weighted wire or cord wound on the hand arbor and marking on a strip of paper moved by clockwork. The Provisional Specification mentions some modifications. Auxiliary clockwork may be used to move the levers and clicks, or they may be actuated by electromagnets. Electricity may also be used to communicate the motion of the rotating shaft to a distance, or it may be so communicated to the indicator by a wire, or pneumatically.

*Telescopes.*—Clockwork driving-mechanism is regulated by a brake actuated by a lever B, D, Fig. 5, Provisional Specification. The wheel C is set by hand to a division of a dial corresponding to the speed desired. So long as the wheel A connected with a running shaft of the clockwork moves at this speed, the wheel B revolves upon the end of the lever B, D without moving it, but if any change of speed occurs, the lever B, D is moved and the tension of the brake strap increased or relaxed as the case may be.

Abridged also in *Classes Animal-power engines &c.; Electricity &c., Div. III.; Gas distribution; Governors &c.; Hydraulic machinery &c.; Lamps &c.; Registering &c.*

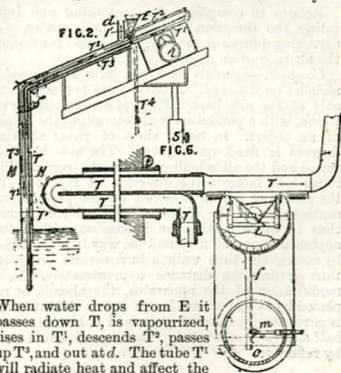
2708. **Gardner, H.**, [*Tremeschini, J. A., and Lion, F.*]. July 14.

*Pyrometers.*—In the furnace &c. is placed a tube through which circulates a fluid, gaseous or liquid. The temperature of this fluid is determined by any thermometer placed in or near it; from this is ascertained the temperature of the furnace. The Provisional Specification states that "to insure circulation a tube in the form of a 'thermosiphon' is used, with an enlarged upper end, and one lower branch in a 'refrigerator'."

*Thermometer.*—The range of temperature of the fluid may be made small by increasing the distance of the thermometer from the radiating-surface, so that a delicate instrument may be used. Tremeschini's thermometer is preferred, which is fixed to a rack *f*, Fig. 6, worked by a pinion. A needle *m* moves over the dial *o* to indicate the distance of the thermometer from the radiating-surface. The instrument is graduated in accordance with the laws of radiation.

*Temperature of liquid in boilers.*—T, T', T<sup>2</sup>, Fig. 2, is a tube, one end ending in a funnel E, and the other opening into a tube T<sup>3</sup>. Both ends of this

tube T<sup>3</sup> are closed, near the bottom, by a partition. Near the other end of T<sup>3</sup> is a chimney *d*.



When water drops from E it passes down T, is vaporized, rises in T', descends T<sup>2</sup>, passes up T<sup>3</sup>, and out at *d*. The tube T<sup>1</sup> will radiate heat and affect the

thermometer *t*. When cold air is used, E is replaced by the tube T', and the inclined parts of T, T', T'' may be horizontal. The height may be varied by the support S.

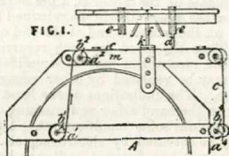
*Temperature of furnaces.*—T, Fig. 6, is a tube of refractory clay, and air passes in the direction shown. The part of T opposite the thermometer is a square copper tube which may be coated with lampblack. Another form consists of a closed tube placed in the furnace which is provided internally with diaphragms to intercept the incident rays, and to form a cylinder of rays that will affect the thermometer. Another arrangement consists of a closed tube containing a bar of metal; this bar is pulled out sharply opposite an opening in the side of the tube opposite which the thermometer is placed.

*Thermometers.*—On the axis of the pointer may be placed a double helicoidal groove, or a screw thread which commands a fork terminating the rod of the lever joined to the movable end of the plate of Tremschini's thermometer.

**2730. Steenberg, A.,** [*Alsing, F., and Sachmann, H.*]. July 16.

*Magnetic compass, registering.*

—A is the face of an ordinary ship chronometer or other clock work which gives uniform motion to the roller *b*, on which is a band of paper *c*. The pivot of the compass needle is attached to the frame of the chronometer, and the needle carries a small holder *e* in which is loosely fixed a marker *d*. If two pens are used, serving to balance the compass card, two diagrams can be obtained.



**2857. Brewer, E. G.,** [*Betboy, P. J.*]. July 26.

[*Provisional protection only.*]

Relates to compasses for measuring and indicating the direction of places and routes, for surveying purposes generally, and also for finding the altitude of an object.

*Compass.*—Consists of a box with two movable alidades on the card. A fixed index is placed in an axis of the side bars. There is a regulating-level which, with a pendulum &c., determines the height of an object. In use a sheet of paper showing degrees is fixed on a pivot. The side bars are raised and the alidade directed on the route. The index will indicate the direction of the route on the card, and a line is drawn on the paper representing it and the distance. Several routes may be quickly taken in succession. With this apparatus a person may find his way in a forest &c. by noting the time walked in a certain direction, thus getting the distance approximately. In a modification of the apparatus, the alidade is replaced by two apertures in the box. Half the card is covered with silvered glass, and a hinged frame half silvered is provided. The objects will be seen by reflection.

*Measuring altitudes.*—In finding the height of an object the angle it subtends is found, and this, with the base, is drawn, the height of the object being found graphically.

**2866. Clark, A. M.,** [*Lefebvre, V.*]. July 26.  
[*Provisional protection only.*]

*Weather indicator.*—Paper or other fabric is soaked in chloride of cobalt, glycerine, and chloride of sodium. The two latter make the material hygroscopic, while the colour of the former will vary, depending on the amount of moisture present. The state of the atmosphere will thus be indicated by the colour of the fabric. A series of permanent colours are placed beside for comparison.

*Reflectors.*—The fabric thus prepared may be made into reflectors.

Abridged also in *Classes Furniture &c.; Umbrella &c.; Wearing-apparel, Divs. II. and IV.*

**2889. Brewer, E. G.,** [*Boucher, J. N. H.*]. July 28.

[*Provisional protection only.*]

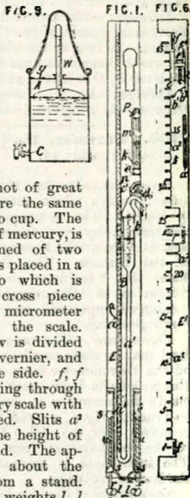
*Spectacles.*—A metallic fabric is formed of a succession of rings, interlaced and alternate, of copper, zinc, and iron, or gold, silver, and iron, and may be used in making spectacles and eyeglasses, bracelets, &c., &c.

Abridged also in *Classes Electricity &c., Div. I.; Fencing &c.; Medicine &c.; Wearing-apparel, Divs. I., II., and IV.*

**3028. Pitt, S.,** [*Yagn, N., and Surrillo, L.*]. Aug. 9.

*Manometer for altimeter.*—The end of the limb *a* of a tube *a, a'* is open. The limb *a'* terminates in a cup *b*, the capacity of which is a little greater than that of the tube. The cup is fitted with a lid from which passes a tube *c*, with a branch *c'* and air tap *d*.

For cases not of great accuracy, both limbs are the same length and there is no cup. The manometer, half full of mercury, is placed in a case formed of two boards *E*. This case is placed in a comb-like scale *e*, to which is afterwards fixed a cross piece in which works a micrometer screw *e'* for moving the scale. The head of the screw is divided and works against a vernier, and there is a scale at the side. *f, f* are guiding pegs passing through slots in *E*. An ordinary scale with a vernier may be used. Slits *a''* and *a'''* in *E* enable the height of the mercury to be read. The apparatus is supported about the middle by a hook from a stand. The friction shoes or weights *l, l* rest on a flat base and keep the instrument vertical.





*Plumb-line.*—A tube  $m$  containing liquid, into which a plummet dips, is fixed to E.

*Manometrical altimeter.*—A, Fig. 9, is a reservoir connected by a flexible tube C to any pressure gauge, as the one above described. If A is made of glass there is a metal covering with a slit in: if made of metal there is a float V attached to a scale W. A water gauge may be used.  $y$  is an air hole. The constant of the instrument is found at any time by hanging the reservoir on the stand of the manometer at two different heights. The stand may have three legs, or a single stake or a cruciform foot. The difference in vertical height of two stations is determined by placing the reservoir, containing liquid, at one station and the manometer at the other, the two being connected by the tube. From the reading of the manometer the vertical height is found.

Abridged also in Class Registering &c.

### 3161. Mewburn, J. C., [Caselli, J.]. Aug. 20.

*Magnetic compass.*—The compass is described in combination with hydraulic or steam steering-gear. The magnetic needle  $m$ , Fig. 6, is formed of thin steel plates and enclosed in a glass or metal sheath E fixed in an aluminium support  $f$ . This support terminates in two conical points  $z$ , formed of an alloy of gold, silver, and platinum, to engage holes in two rubies in the ends of screws, by means of which the sheath is supported in a frame fixed in a bronze box D, Fig. 1. The box is filled with equal parts of distilled water and glycerine, and held by pivots in its support to maintain it in a horizontal position, any oscillatory movement being prevented by the action of aluminium wheels and helicoidal gearing. The box can be rotated on its vertical axis by a

FIG. 1.  
(Sheet 3)

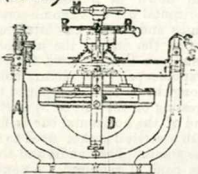


FIG. 6.  
(Sheet 3)

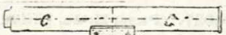
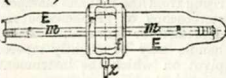
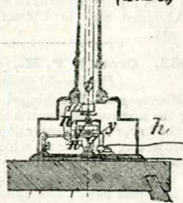


FIG. 11.  
(Sheet 3)



handle M, Fig. 1, a disc R carrying a graduated card passing under an index when the box is turned. A vertical rod  $n$ , Fig. 6, carries an index which marks upon a micrometer the degrees of deviation of the needle, the rod, when the needle turns to the right, meeting a horizontal lever fixed at right angles on a vertical shaft  $x$  set in rubies and the lower end of which dips in a reservoir R containing mercury. Conducting-wires S, S, from a commutator, are connected to screws on the support A of the compass in such a way that the steering is regulated by the action of the needle.

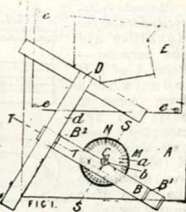
*Telescope.*—The telescope is described in connection with hydraulic or steam steering-gear for directing by means of electromagnetism the course of a vessel. The telescope C, Fig. 11, is mounted upon a column  $l$  so that it can be turned in all directions upon a central shaft  $t$ , the latter forming at  $n$  a double square in which is a vertical shaft carrying a lever  $v$ . The end of this lever bears by the pressure of a spiral spring upon a screw  $y$  which carries the conducting-wire  $h$ , the deviation of the telescope thus opening and closing the circuit and allowing the course of the vessel to be maintained parallel to the axis of the telescope.

Abridged also in Classes Electricity &c., Div. III.; Pumps &c.; Ships &c., Divs. II. and III.; Signalling &c.

### 3175. Wise, W. L., [Wadsworth, H.]. Aug. 21.

*Plotting-instrument*

for surveyors &c.—A graduated plate M is sunk into the drawing board A, and over it moves the "degree indicator" B, which can be fixed at any angle by a thumb-screw C. At the two ends of B are grooves B<sup>1</sup>, B<sup>2</sup> into either of which the T-square D,  $d$  can be fitted to slide. At B<sup>1</sup> and B<sup>2</sup> there may be a clamp for securing the T-square, both limbs of which are of the same thickness and width, so that either arm may fit in the groove. Both sides may be used for ruling, and one side may be graduated. Various refinements may be added: (1), a vernier may be combined with M; (2), a tangent screw may be employed for adjusting B; (3), a microscope may be mounted over M.



### 3299. Bain, R. Aug. 30.

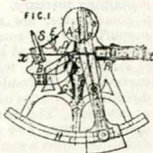
[Provisional protection only.]

*Course indicators and correctors.*—A dial, graduated reversely, i.e. with the E on the left hand side, and the W on the right, is fitted in the centre with a style, and hung in gimbals, or adapted to be fixed with thumb-screws. To use the instrument, the sun's true azimuth is found from the tables and placed on the card to the ship's head; the shadow of the style then indicates the true course of the ship. For use with a star or light, a style is substituted, which is provided with a fork piece

carrying in bearings a cross-piece fitted at each end with a sighting-piece or sights. This cross-piece may be elevated or deflected. The style carries also a pointer, which may be moved round to any desired position upon the dial.

**3456. Voss, B. T. F.** Sept. 13.

*Sextants, artificial horizon for.*—The sight line  $x, x$  of the telescope passes just above the surface of the plate D, which is supported between bearings, and is kept horizontal by the counterweight G, so that, if the telescope is not horizontal as well, the line of vision will be interrupted. The telescope is furnished with a cover R which has a very fine horizontal slit and semicircular openings. The counterweight may be furnished with adjusting-screws for securing an exact balance of the plate. On the top of the plate may be a weight (with a passage through for the rays of light) for reducing the vibration of the plate.



**3552. Hickley, A. S.** Sept. 21.

*Magneto-electric apparatus for signalling and like purposes.*—

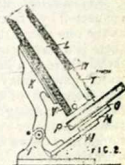
Poles I of soft iron (which form cores to coils C) are mounted upon extension plates E (also of soft iron) attached to the poles of a simple or of a compound permanent magnet M. An armature is fixed to one end of a lever L, pivoted at B and operated by a rod R around which is a returning-spring. Whenever the rod R is depressed an electric current passes through wires S, and upon its release a return current passes through the circuit. A pair of armatures may be used to excite two currents each way for each depression of the lever L. In this case the core I will be held at the centre by an extension plate and the two armatures placed at the ends of the core. The apparatus is intended to apply to signalling for use in connection with sounding-apparatus &c.

Abridged also in Classes *Electricity &c., Divs. I. and III.; Fire-arms &c., Div. II.; Fire, Extinction &c. of; Hydraulic engineering; Mining &c.; Railway signals &c.; Registering &c.*

**3627. Ambridge, G. W.** Sept. 27.

*Kaleidoscope.*—The darkened tube L is fixed to an arm K, pivoted to duplex pillars I; or I and K may be in one piece and the tube be

fixed vertically. The tube contains, at its lower end, two or more plane mirrors T, inclined to each other, and has a lateral aperture for the admission of light. It is open at the bottom and has a plane eye-glass at S. The angle between the mirrors is adjusted by means of screws V and a spring W. An elliptical piece N, pivoted to the rim of a stage M, carries a circular piece O to which a shallow tray P is pivoted. Opaque objects are placed in the tray, which is rotated to obtain different designs. Or the tray may be omitted, the objects being placed on any suitable surface. For viewing objects by transmitted light, the tray is made transparent. Abridged also in *Class Toys &c.*



**3947. Bishop, F., [Cremer, J.]** Oct. 25.

[Provisional protection only.]

*Stereoscopes and graphoscopes.*—The instrument is mounted on a horizontal bar, the graphoscope lens being mounted on a vertical stem fitted to slide up and down in a socket piece attached to the horizontal bar by a thumb-screw. The stereoscope lenses and shade are fitted with a socket which fits on the end of the horizontal bar. The same stand can thus be used for either stereoscope or graphoscope. The picture holder is fitted to slide along the bar, and is retained in place by a spring pressing on the bar, or by a set-screw. To the lens end of the horizontal bar is fixed a handle fitting into a vertical socket fixed to the foot or base of the stand. The handle and the bar may be held in the hand if required. A connecting link is joined at one end to the lower end of the socket, and at the other end to the foot, the link being held in any position by binding-screws; or the link may be a straight bar received in a hollow post or socket rising from the foot and clamped by a set-screw; the stereoscope or graphoscope may thus be readily depressed or elevated. The lower end of the handle may be slightly tapered so as to form a pivot on which the instrument may be laterally rotated.

**4027. Pass, E. de, [Elliott, A. H.]** Oct. 30.

[Provisional protection only.]

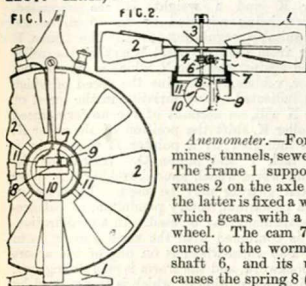
*Tripod stand for rock drill.* Consists of an adjustable tripod with telescopic legs and having the back leg hinged so as to give any required angle. Abridged also in Classes *Mining &c.; Photography.*

**4063. Crouch, P. H., [Gundlach, E.]** Nov. 1.

[Provisional protection only.]

*Microscopes.*—The hinged bracket or arm carrying the microscope consists of two parts. The face of the lower has a slot or depression in which slides a projecting piece or rib which forms the foot of the upper part. The downward movement is effected by a thumb-screw, worked through the upper end of the lower part. The upward movement is caused by two or more flat springs, which at the same time serve to attach the rib to the lower part of the bracket at the back of the slot thereof.

4207. Hall, H. Nov. 10.



*Anemometer.*—For use in mines, tunnels, sewers, &c. The frame 1 supports the vanes 2 on the axle 3. On the latter is fixed a worm 4, which gears with a worm-wheel. The cam 7 is secured to the worm-wheel shaft 6, and its motion causes the spring 8 (which is attached to the bracket 9)

to vibrate. For testing ventilation &c. the apparatus is placed in any desired part, and the air currents acting on the vanes 2 cause the spring 8 to give out sounds, varying with the speed of the air currents. These are transmitted through the telephone 10 and the wires 11, to one or more telephones situated at any required stations. Or instead of telephones the motion of the spring 8 may be made to make and break an electric current, and thereby operate one or more bells, or give motion to an indicator.

Abridged also in Class *Electricity &c., Div. III.*

4244. Reynaud, C. E. Nov. 13.

*Prazinoscope.*—The wheel H, Fig. 3, revolves about the axis O, and carries in the centre a regular prism, built up of mirrors or other reflecting surfaces, the radius of this prism being exactly half that of the wheel. The circumference of the disc carries a series of illustrations of any description, and equal in number to the sides of the prism, or more or less numerous, according to the effect to be produced. The instrument may be set in motion by hand, clockwork, electricity, or any other means. Modifications: (1), a movable screen A, B, C, D, E, F may be fixed to O so that it does not revolve with the disc; (2), two instruments may be combined to revolve on a horizontal axis, with two series of stereoscopic pictures, the central animated pictures being then viewed with a stereoscope; (3), a lamp or candle may be fitted to the fixed axis O; (4), an animated picture may be projected on a screen by using transparent pictures; two sources of any brilliant light send converging rays through the pictures on to the mirrors, and the rays are then reflected by the mirrors on to one object glass, which projects them on the screen.

Abridged also in Class *Toys &c.*

4281. Haseler, W. H. Nov. 15.

*Magnetic compasses.*—A small figure, as shown, is fixed to the upper side of the needle, or to the card, to more readily distinguish the N. point. The needle itself may in some cases be made in the form of any such figure. In order to



rapidly reduce the amplitude of the needle, portions of the figures, e.g. wings of birds or insects, are bent upwards or downwards; or vanes may be fixed vertically on the underside of the figure, needle, or card.

4316. Hildebrandt, J. A. R., [Pelzer, F.]. Nov. 17.

[Provisional protection only.]

*Tripod stand for rock drill.* The drill spindles rest in a saddle or in eyes on two bridges connected by a bar prolonged to form a leg. The other legs, which are telescopic and adjustable, are split and pivoted to a pin on a plate having a quadrant slot in which a bolt on the leg is adjusted by a nut. The pivots and the quadrant plates form a universal joint.

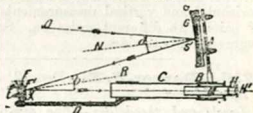
Abridged also in Classes *Mining &c.; Photography.*

4327. Lake, W. R., [Fritsch, C., and Forster, J.]. Nov. 19.

[Provisional protection only.]

*Telescopes.*

—To the tube of the telescope two brackets B and D are fixed, carrying reflectors G and F, which are attached by means of set-screws. G is concave and F, the smaller, concave, convex, or plane.



4357. Barlow, W. H. Nov. 20.

*Drawing-appliance.*—Consists of a holder for supporting small brushes, tinned pencils, elastic pens, &c. to prevent irregularities in the breadth and steadiness of lines drawn therewith. The handle C is formed with one or more projecting supports B. The holder A, arm D and socket for the end of the handle are made in one piece, but they may be separate, and jointed &c. for the adjustment of the pencil &c. for lines of different breadths &c., and other variations may be made. The holder may be applied to drawing-instruments such as bow sweeps, pantographs, drawing-pens, &c.



4451. Fraser, A. C. Dec. 1.

[Provisional protection only.]

*Magnetic compasses.*—The magnetic polarity of the card or needle is insulated from outside surrounding influences by using a compass bowl or casing of black hard rubber, which is moulded into shape with a bulb in the centre of the bottom piece into which the point or centre stem is embedded. The card of printed paper, which is tinted, is pasted on a disc or plate of aluminium, the outer edge of which projects beyond the edge of the paper to take the pressure of the spring plate. On the top edge of the casing a lip rim is formed to which is cemented or screwed a top or lid having a V-shaped aperture in it, and provided with a glass

across which the shadow of the hair line can be seen very distinctly.

**4572. Wirth, F.,** [*Pult, P.*]. Dec. 3.

*Coloured glasses for tourists.*—A rim of cardboard &c. is fitted with coloured glass or gelatine. A series of colours may be fitted or made to fit in one case. Fig. 1 shows one form of cardboard rim, but the two glasses may be replaced by one long one. The frame may also be made like an ordinary eyeglass frame and fitted with one long glass.

Abridged also in *Class Toys &c.*



**4715. Crofts, W. G.** Dec. 12.

[*Provisional protection only.*]

*Set-squares.*—These are bevelled on the upper edges, while on the surface scales are engraved or otherwise marked, which are at right angles or inclined to the sides of the set-square and from angle to angle of the respective external and internal sides. There may be only one pair (for horizontal and vertical measurements), or a series of pairs with different scales on. Scales may be engraved on both sides.

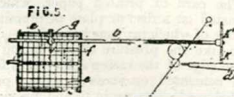
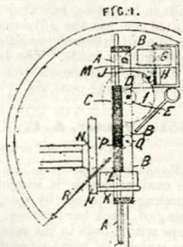
**4716. Dancer, J. B.** Dec. 12. *Drawings to Specification.*

*Levels and theodolites.*—The eye-pieces of the telescopes are made to screw in and not to slide. The adjusting-screws of the diaphragm carrying the cross lines are concealed by a ring or tube. The sliding tubes for adjusting the focus are protected from rain &c. by means of covering-tubes. The ends of the screws which belong to the parallel plates of the theodolite or level are made to work on steel, agate, or other hard substance embedded in the lower parallel plate.

*Levelling-staves.*—These are made of light materials, such as papier mâché, which can be compressed into shape and then varnished or japanned.

**4781. Royle, J. J.** Dec. 15.

*Anemometers, logs, &c.*—Relates to speed indicators in which a disc-and-roller action is employed. In the case of the wind an apparatus similar to an anemometer vane, and in the case of liquids a water-wheel, is used to work the disc or one of the indicating-apparatus. In Fig. 1, a spindle A, capable of sliding in bearings in a frame B, has at its upper end a worm C, through which the gearing D, I, and J drives



a fly G. On the lower part of the spindle A a roller K and a weight L are mounted, the latter being adjusted so as to drive the fly at a suitable regulating-speed. The frame B is swung from the fixed stud M so that the roller is pressed against the disc N, which is driven from the motor, vehicle, or machine the speed of which is to be indicated. Any variation in the speed of the disc N will, on account of the uniform speed of the roller K, shift the position of the roller K, which is indicated by a pointer R worked by a circular rack P and pinion Q. Instead of the worm and worm-wheel, spur, bevel, or any other differential gearing may be used. In place of the fly, a pendulum, rotary pendulum, or balance-wheel escapement may be used. In a modification, a clock is combined with the same gearing as in Fig. 1. The worm-wheel is on one of the arbors of the clockwork, and the worm is on a sliding axis, the longitudinal motion of which is transmitted by a lever on a rocking shaft and a quadrant and pinion to the pointer. The time may be indicated on the same or on a separate dial. In another modification, the disc is mounted upon the arbor of the escape or other wheel of a clock, the worm running through a nut wheel driven by the engine &c. Or the differential motion may be arranged to lengthen or shorten a pendulum, the length of which indicates the speed.

*Recording.*—The shaft b, Fig. 5, is driven from the worm-wheel D, Fig. 1. The roller K rests on a cone d, (driven from the engine &c.) the uppermost generating-line of which is parallel to the shaft b. A drum e, which is worked by clockwork, carries a sheet of paper divided into hours and speed divisions. A pencil &c. f is in a holder g on the shaft.

The maximum speed is recorded by driving the drum from the reversing-gear or handle of the engine.

Abridged also in *Class Registering &c.*

**4785. Tongue, J. G.,** [*Lacome, J. M. A., and Lefebvre, L.*]. Dec. 17.

*Projecting advertisements on the pavement.*

—The lamp &c. is fitted, beneath the downwardly-directed jet K, with a vertical tube C containing magnifying-lenses I, Figs. 1 and 2. Advertisements, mounted as transparencies on the arms H, H seen in section in Fig. 2 and plan in Fig. 4, are brought over the tube C at intervals by clockwork or other apparatus contained in the box D. Within the tube C is a smaller tube for focussing and a shade E surrounds the rays R.

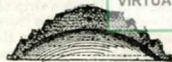
Abridged also in *Classes Advertising &c.; Toys &c.*



## 4878. Thompson, W. P., [Haughton, C. F.]. Dec. 24.

*Lens*.—Relates to a meniscus lens, having, on either or both of its surfaces, a series of concentric prism-like elevations and depressions. The lens is especially suitable for use in signal lamps.

Abridged also in Class *Lamps &c.*

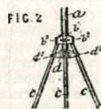


## A.D. 1878.

## 20. Ward, J. Jan. 1.

*Tripod stand*.—Consists of a tube *a* on which slides a collar *b* having three or more radially-slotted arms *b'*, to which the upper flattened ends of the rods *c* are jointed. At the bottom of the tube *a* is fixed a plate *d* having arms *d'* corresponding to those on the collar *b'*. The arms *d'* are bored with slanting holes in which the rods *c* slide, the holes being further from the centre than the joints of the rods. By sliding the collar *b* upwards on the tube *a* the stand is collapsed.

Abridged also in Classes *Furniture &c.*; *Photography*.



## 63. Macartney, H. Jan 4.

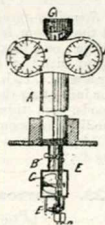
[Provisional protection only.]

*Sundial and compass*.—By this instrument the longitude of any spot can be obtained by one observation, at any time when the sun's rays are visible. On the top of a compass box, which is fitted with adjustable supports and spirit levels for enabling it to be set accurately to a horizontal position, is hinged a clock dial, having hands, which are worked by turning a spindle, connected therewith by spur gearing. The compass card and the dial are so arranged that the poles of the former correspond with the hours VI. and XII. of the latter. Standing up from the clock dial, through the tubes which carry the hands, is a style also moved by the spindle and supporting a tube suitably hinged thereon. This tube is closed at both ends, but is open for a short distance at the upper side, near one end, to bring the interior into view. In the opposite end of the tube is a fine vertical slit, a corresponding slit being formed in a diaphragm inserted in the tube, near the top opening. To take an observation the hinged dial face is first set to the angle required by the latitude of the spot, as indicated by a graduated sector, and the compass brought to bear due N and S. The tube is then adjusted so as to bring its slit opposite the sun in such a way that the ray of light entering thereby passes through the slit in the diaphragm and strikes on the closed end of the tube. The style is then turned by means of the spindle until the width of the ray is diminished to its vanishing point, which action brings the dial hands to the exact solar time. By comparing this with Greenwich time and making the necessary allowances the longitude is ascertained.

Abridged also in Class *Watches &c.*

## 24. Clark, A. M., [Carroll, D.]. Jan. 1.

*Ships' logs*.—A tube *A* reaches down from the first deck through the bottom of the vessel. The working parts, which are lowered through this tube, consist of an upper water wheel or screw *B* with shaft parallel to the axis of the vessel, a lower wheel *C* with shaft at right angles to the first, and a speed-indicator *D*. These are supported by the frame *E*, *E'* within the tube. The wheels are connected by worm gearing with duplicate registering-apparatus *I*; the upper one gives the forward motion of the ship, and the lower one the drift motion, the distances being shown on dial plates. Each registering-apparatus can be regulated by suitable mechanism. The speed-indicator consists of four intersecting blades *D* hung to an inclined swinging shaft, the latter being connected to a vertical shaft in such a manner that the deflection of the blades produced by the direct motion of the ship produces a vertical movement of this shaft, while the deflection caused by the drift motion produces a turning movement. These two movements of the vertical shaft are indicated by a pointer on an arc-shaped scale *G* to measure the speed of the direct movement and drift respectively.



## 78. Barr, H. J. Jan. 5. Drawings to Specification.

*Log indicators*.—A core, with wings or fans, revolves in a metal cylinder, open at both ends, and gears with a train of wheels, the last wheel of which revolves once for each quarter of a nautical mile that the fans are drawn through the water, and completes the circuit, by contact with a stud, through a battery and electric recording-instrument,

causing it to mark a strip of paper moved uniformly by clockwork. The revolutions of the engine may also be recorded on the same paper by making and breaking contact on a galvanic recording-instrument.

Abridged also in Class *Registering &c.*

**317. Peroni, L.** Jan. 24. *Drawings to Specification.*

*Thermometer tubes.*—The bore is placed out of the geometrical axis of the tube, and the section is such that the curved surface acts as a lens, causing the bore to appear magnified. Various sections, such as approximately rectangular, circular, or oval, may be employed. The tube is preferably formed with an enamelled back.

Abridged also in Class *Glass.*

**329. Soul, M. A.,** [Bain, R.]. Jan. 24.

[*Letters Patent void for want of final Specification.*]

*Course indicator or corrector.*—Relates to apparatus for indicating the true course by means of the sun, the stars, or other objects. A compass dial is marked with E on the left-hand side, and W on the right-hand side; it is supported in gimbals or fixed with thumb-screws. When making use of the sun, a style is fitted in the centre of the dial, and its shadow gives the true course, the true azimuth bearing of the sun having been previously found by tables. To find the course by any other object, a vertical rod with a fork piece is substituted for the style, a cross piece carrying at the end a sighting-piece or sights being mounted in bearings in the fork. The vertical rod carries a pointer which moves over the dial.

**381. Clark, J. L., and Hill, E. J.** Jan. 30.

[*Provisional protection only.*]

*Sounding-apparatus.*—A kite-shaped plate of metal or other material is provided with two lines attached to the middle and the tail respectively, so that the plate dives downwards in the water. The lines are marked to indicate the depth. The plate may be towed at any required depth and one of the lines may be arranged to be detached automatically on the kite striking the bottom; the kite will then rise to the top, and the other line, in changing its angular position, may actuate a bell or the like. Electric conductors may be enclosed in one or both lines and a contact-maker operated by the kite on striking the bottom to sound an electric alarm.

Abridged also in Class *Electricity &c., Div. III.*

**496. Swift, J.** Feb. 6.

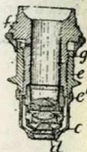
[*Provisional protection only.*]

*Microscopes &c., rack adjustment f.r.*—Consists in the application of a screw pinion A, the cogs of which are helices of a suitable pitch to gear with the angular rack B. By the use of this form of adjustment the usual fine adjustment is rendered unnecessary except for very delicate work.



**603. Newton, A. V.,** [Grundlach, E., Bausch, J. J., and Lomb, H.]. Feb. 13.

*Microscopes.*—Relates to the adjustment of the object glasses to suit the varying thicknesses of the glass covers of object slides, and consists in placing an adjustable flat transparent disc *d* in advance of the front lens *c* of the objective, and filling the intervening space with a highly-refractive fluid, such as glycerine. The disc is fixed in a cup-shaped setting *e*, which is screwed to the ring *e*; and it is made to advance or recede from the lens *c*, to vary the thickness of the liquid layer, by turning the ring *e*, which engages with the screw *g*, upon the exterior surface of the objective *f*.



**648. Clark, A. M.,** [Grundlach, E., Bausch, J. J., and Lomb, H.]. Feb. 15.

*Object glasses.*—For correcting chromatic aberration, these are constructed with a double concave lens of flint glass A, with two positive crown-glass lenses C, arranged as shown. The corrections for spherical aberration are effected by using one or more concavo-convex lenses of crown glass; the concave surface of the latter has a shorter radius than the convex surface of the lens C next to it, so that a space remains between them in the shape of a meniscus. This objective has the advantage of crown glass external surfaces from which the loss of light is not so great as from those of flint glass.



**787. Clark, A. M.,** [Decoulan, J.]. Feb. 25.

[*Drawings to Specification.*]

*Sounding-apparatus.*—An air-vessel with an inlet at the bottom is connected by a pipe to a pressure gauge; or a maximum pressure gauge may be combined with it so that the apparatus may be lowered by a cord. It is applicable for sounding wells and for indicating the varying levels of rivers, streams, floods, and tides. The pressure gauge may be modified to operate signals or recording-mechanism.

Abridged also in Classes *Brewing &c.; Registering &c.*

**833. Morton, A.** March 1.

[*Provisional protection only.*]

*Indicating velocity of draught in furnace flues.*—The gauge comprises an induction apparatus resembling an ejector. The space between the two nozzles is connected by a tube with the exhaust side of the gauge, and the entering end of the casing with the pressure side.

Abridged also in Classes *Furnaces &c.; Manufacture of iron &c.*

**868. Musgrave, D. S., and Humphreys, T.** March 4. *Drawings to Specification.*

*Reflector combined with sunblinds.*—Relates to shutters which can be raised and extended to act as sunblinds, and to which are attached reflectors to

reflect the gas light from inside upon the goods in the window.

Abridged also in Classes *Buildings &c.*; *Chains &c.*; *Furniture &c.*; *Ropes &c.*

**878. Lake, W. R.,** [*Celluloid Manufacturing Co.*] March 4.

*Eyeglass frames.*—These are made of plastic composition in a stuffing-machine, the material being passed over a wooden &c. core of any desired shape previously lubricated with rosin-less soap, &c. The material may be drawn by hand over the core, and, in drying, shrinks firmly thereto; the material and the core are then cut through and the core removed.

Abridged also in Classes *Chains &c.*; *Hydraulic machinery &c.*; *India-rubber &c.*; *Moulding &c.*; *Toilet &c.*; *Wearing-apparel, Div. IV.*

**904. Parkes, S. H.** March 6.

[*Provisional protection only.*]

*Microscopes.*—For use as a simple microscope the object glass alone is used, and is pushed tightly into a fine-adjustment tube which slides in a short tubular holder attached to the arm of the instrument. To convert the instrument into a compound microscope, a tubular body for carrying the eyepiece is made to slide on to the holder.

**1001. Reynolds, W. F.** March 13.

[*Provisional protection only.*]

*Magnetic compasses.*—By means of a glass partition the binnacle case is divided into a needle compartment and a lower chamber containing a reflector illuminating the card. The card chamber may be fitted with a lamp either above or below the card. Instead of ordinary sights a "Palinurus" may be used consisting of an upright disc travelling round the hour circle and provided with a pinion and a pointer moving round a declination scale. A rock frame is hinged to the disc, with a toothed rack which engages with the pinion of the disc. By this means the deviations of the compass can be obtained by an observation of some heavenly body and the sun's shadow. This observation may be made in or near the tropics, and not only in high latitudes, as with the ordinary Palinurus.

**1066. Ryan, J.** March 18.

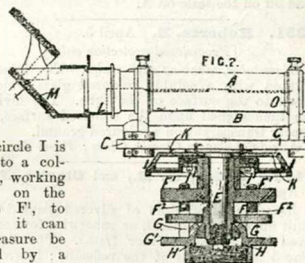
[*Provisional protection only.*]

*Builder's level.*—Consists of a dial set in the middle of a length of wood &c., and provided with a weighted index, which setting in a vertical position indicates the level.

**1073. Trench, J. T., and Barnardo, G. C. F.** March 18.

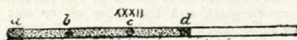
*Surveying-instrument.*—For levelling and obtaining horizontal angles. Consists of a telescope A and spirit level B, fitted on a plate C, which is supported by the axis E, received in the socket F. The latter is fixed by a hemispherical nut H to the tripod, which bears an inverted

cup G. The plate C is set horizontally by means of the levelling-screws F'. The gradu-



ated circle I is fixed to a collar J, working freely on the socket F', to which it can at pleasure be locked by a clip. A tangent-screw may be used for setting the circle at zero. A vernier is formed by a graduated plate K, which is fixed to the plate C. The mirrors M attached to the tube L are used when the objects are not in the same plane as the telescope. The lower mirror M is fixed at an angle of 45°, and the upper mirror can be inclined at any desired angle by a lever handle. The tube L is given a half turn when the object is below the plane of the telescope.

**1136. Wise, W. L.,** [*Grouven, H.*] March 21.

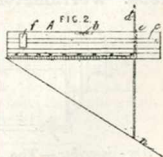


*Pyrometer.*—For sulphate of ammonium furnaces, a porcelain tube is closed at one end with a cork a; powdered charcoal is then placed in the tube, and next a piece b of an alloy of 72% copper and 28% antimony; after which more charcoal powder is inserted, and then another piece c of an alloy of 75% copper and 25% antimony; more charcoal powder is next inserted, and then a plug d of asbestos. For a higher temperature the pyrometer is similarly made except that the alloy at c is of 80% copper and 20% antimony, and at b is of 75% alloy. In use the alloy at c should melt, but that at b should be only affected at its edges.

Abridged also in Classes *Acids &c., Div. II.*; *Furnaces &c.*

**1240. Fairley, W.** March 29.

*Clinometer.*—A graduated rule A is provided with a spirit-level b, and graduated slides c, d. In use, the slide d is passed through a transverse aperture e. The rule A is fixed horizontally, one end resting on the plane n to be measured and the slide d pushed down until it also touches the plane, when the angle of inclination can be read off on d. Should the plane be at an angle greater than 45°, the slide d is with-



drawn from *e*, and pushed into the socket *f* on the slide *c*, which is drawn out and the inclination read off on the scale on *A*.

**1351. Roberts, E.** April 5.

[Provisional protection only.]

*Glass-tubes, marking with scales.*—The tubes are painted with a soluble coloured glass which is fused to the surface of the tube. The divisions are then etched upon the coloured surface, and appear transparent on a coloured ground.

Abridged also in Classes *Glass*; *Pipes* &c.

**1442. Alder, G. E., and Clarke, J. A.** April 11.

*Reflectors.*—Reflectors of silvered glass &c. are built up of small pieces, or otherwise formed and fixed in a metal or other frame. The light is placed in the focus of the reflector; in front of the light are placed one or more screens of opal or ground glass, or other semi-transparent medium. An electric or other powerful light is employed.

Abridged also in Classes *Electricity* &c., *Dir. IV.*; *Lamps* &c.; *Photography*.

**1493. Tydeman, E. M. T.** April 15.

[Provisional protection only.]

*Achromatic lenses.*—The lenses instead of being made of different kinds of glass &c. are formed of specimens of the same kind of glass or other substance with different refractive powers. For microscopes, the object glasses may have one set or sets of achromatic lenses of one substance, as of crown glass, and the other set or sets of another substance, as flint glass, or single lenses of crown or flint glass may be used. The application to telescopes, cameras, and magic lanterns is also mentioned.

Abridged also in Classes *Photography*; *Toys* &c.

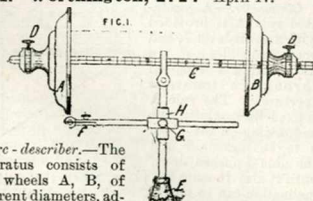
**1500. Miles, J. H., and Young, F.** April 15.

[Provisional protection only.]

*Chromatropes.*—Advertisements are placed on the revolving dials so as to be visible once in every revolution, or on a stationary disc before, between, or behind the revolving ones, the variegated colours being left out opposite to the advertisement. The apparatus may be fixed in any public places and to any kind of lamps, preferably with a reflector behind, and be illuminated at night and thrown upon screens, pavements, &c.

Abridged also in Class *Advertising* &c.

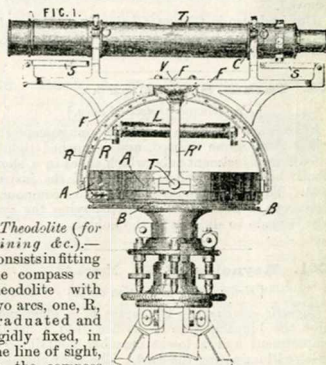
**1554. Worthington, T. P.** April 17.



*Arc-describer.*—The apparatus consists of two wheels *A*, *B*, of different diameters, adjustable on a graduated

spindle *C* by set-screws *D*, *D*. To the spindle *C* is attached a propelling-handle *E*, to which a pencil holder *F* is secured by a set-screw *G* in a collar *H*. The wheel *A* is graduated to indicate the length of arc described, while both wheels have diameter lines to enable radial lines to be drawn at any portion of the arc. An adjustable straight-edge may be provided for tracing radial lines, with screws to accommodate the rule to the drawing-surface. If the diameter of  $A = a$ , of  $B = a - 1$ , and the distance between  $A$  and  $B = b$ , then the radius of an arc described by *A* will be  $a \cdot b$ .

**1592. Whitelaw, J.** April 20.



*Theodolite (for mining &c.).*—Consists in fitting the compass or theodolite with two arcs, one *R*, graduated and rigidly fixed, in the line of sight, to the compass box; the other *R'* at right angles and free to move in bearings *T*. To the latter is attached the frame *F*, carrying the sights *S*, *S* or telescope *T*. A spirit level *L* is attached to the under side of the rigid arc *R*, for detecting any displacement in the line of sight. For ranging horizontal lines, the opposite sides of the arc *R* are pierced with slits in the same vertical plane as the telescope. The lower limb *B* of the theodolite is constructed of the same diameter as the compass box *A*. Angles of elevation or depression may be read up to  $90^\circ$ , making the instrument suitable alike for surface or underground surveys.

**1594. Cotti, E. J. M.** April 20.

[Provisional protection only.]

*Thermometer and other tubes.*—The etched graduations are filled with a suitable colouring-material, and the tube subjected to a degree of heat sufficient to render the filling permanent.

Abridged also in Class *Glass*.

**1675. Herbert, E. J.** April 25.

[Provisional protection only.]

*Stereoscopic slides.*—A wood frame of suitable depth is fitted with a card bearing two figures of the same design. A second card half the size, having a view of the same figure in different perspective, is placed above the first card to the



extreme right or left of the frame and the two figures now visible viewed through the stereoscope. On tilting the stereoscope the upper card moves over the lower, producing a different appearance.

**1879. Peroni, L.** May 10.

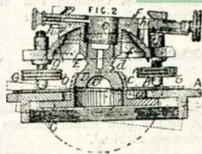
[Provisional protection not allowed.]

*Thermometer tubes.*—Consists in forming them, in section, of such a shape as to prevent them rolling and to impart to them a magnifying-power to ensure facility in reading the scale.

**2084. Davis, A., [Haffman, D.]** May 24.

*Tripod head for transits, theodolites, &c.* Consists of a base-plate A having a central opening *a*, and a carrier plate B with an aperture *b* of less diameter than *a*, into which the neck *c* of the socket plate C fits accurately. The ball D working in the concave bearing *c'*, and forming

the lower ball- and - socket joint, is secured by a screw-threaded end of the neck *e* of the instrument plate F. The upper spherical bearing is formed by the convex annulus *g* on the levelling-screw plate E and the socket *h* on the plate F. The bearings *c'*, D and *g*, *h* are concentric.

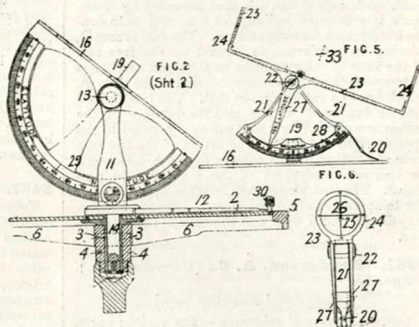


Unslacking any two of the levelling-screws G lets down the socket plate C and allows the carrier plate B to be shifted horizontally until the centre of the instrument is adjusted over the desired spot. By setting up the levelling-screws the instrument may be accurately levelled, at the same time binding the ball-and-socket joints together.

Abridged also in Class Photography.

**2093. Morton, J.** May 24.

*Magnetic meridian, finding.*—Relates to improvements in an azimuthal compass corrector and to certain improvements in the "Palinurus" or compass error detector. Fig. 2 is a sectional detail elevation, where 2 is a horizontal plate graduated with degrees and compass points, secured to a tube 3 working in the boss 4 of an encircling ring 5 connected by radiating arms 6 and supported in gimbals or rectangular bearings and suspended in a horizontal position by a weight. The support 11 is provided with an index 12, and its axis 14 works in the tube 3. The time circle 16 moves on the horizontal axis 13; it may be set at any required angle to the plate 2 by the graduated semicircle 29. To the axis 19 is attached a piece of apparatus having a line of collimation the form being preferably that shown in Figs. 5 and 6. The support 21 is graduated at 28 and is provided with an index 20. The bar 23 is movable at right angles about the axis 22, which is parallel to the time circle. This bar carries at each extremity at right angles to its length a sight vane 24, one having a small aperture 25, the other, further from the eyes, having cross wires 26. By means of the index 27 the line of collimation may be set to any required angle to the plane of the time circle. In use the index 12 is set to the north point of the horizontal circle 2; if the magnetic meridian is required, the variation of the needle at the time and place of observation must be taken into account in setting the index 12. The time circle 16 is then adjusted on its axis at an angle to the circle 2, equal to the co-latitude of the place of observation, which is effected by setting the latitude arc 29 to the latitude of the place. The line of collimation is set at an angle to the plane perpendicular to the time circle, and in which its meridian line is equal to the hour angle of the observed body, by setting the index 20 to the hour and by setting its line of collimation at an angle to the plane of the time circle equal to the declination of the observed body, by adjusting the pointer 27 to the sun's declination. Having made all these adjustments, the horizontal circle is turned upon its axis by the knobs 30, until the shadow of the one sight vane falls on the other. Then the north and south points of the horizontal circle will be in, and indicate, the true meridian. By this apparatus the magnetic direction of a ship's head may be found. When from its position a direct view of the object cannot be obtained, the mirror 33 may be used to reflect the image of the object to the eyes.



**2225. Long, R.** June 4.

[Provisional protection only.]

*Levels.*—A circular glass tube nearly filled with alcohol or other liquid, or, preferably, a semicircular tube with both ends closed, is mounted on a plate with scale attached, the position of the air space

indicating the level. To indicate the vertical, the tube should be carried beyond the diameter line which passes through the air space when the instrument is perpendicular.

**2226. Crofts, W. R.** June 4. *Drawings to Specification.*

*Set-squares &c.*—Consists in forming skeleton set-squares with a slightly-bevelled internal edge, on the upper and under surface of which suitable scales are marked.

**2256. Bowkett, W. D.** June 6.



*Recording clinical &c. thermometer.*—A bent tube C is attached to and communicates with a closed vessel A; both are filled with a suitable fluid, such as alcohol. A dial actuated by clock-work is graduated radially for time and with concentric circles *b* for temperature. The radius arm D, moving on a fulcrum, is jointed to the free end of the tube C. Any motion in C caused by change of temperature will be communicated to the style *d'*, which traces a record on the dial. The bent tube C may be fixed at its middle, and the fulcrum of the radius arm carried by a link which is pivoted to the opposite free end of C. The action of the two free ends of C being in this case in opposite directions, an increased deflection of the style will be produced. The instrument may be arranged to register the temperature of an apartment; here the vessel A may be dispensed with and the tube C increased in size.

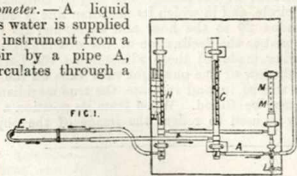
**2381. Henderson, A. C.,** [*Gérardin, P. F.*] June 15.

[*Provisional protection only.*]

*Opera glasses and telescopes.*—The various parts, such as the tubes, bodies, rings, and caps securing the eye-pieces and object glasses, are united by layonet-joints, dispensing completely with screws. The socket of the focus regulator is replaced by a screw having a milled regulator at its socket.

**2400. Saintignon, F. A. J. E.,** *Compte de.* June 17.

*Pyrometer.*—A liquid such as water is supplied to the instrument from a reservoir by a pipe A, and circulates through a

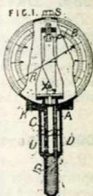


vessel E exposed to the heat which has to be measured. This latter may conveniently be made of porcelain or copper. In the pipes leading to

and from E, thermometers C, H are placed by which the temperature of the supply and discharge may be compared. The water is conveyed by a pipe from the chamber G to the gauge M, where the level is maintained at zero by the stop-cock L, through which the water is discharged into a graduated vessel. A stop-cock N is used to regulate the water supply. The actual excess of temperature of E over the liquid supply is ascertained by multiplying the difference of temperature between thermometers C, H into a constant depending upon the nature of the liquid and the quantity circulating through E in a given time.

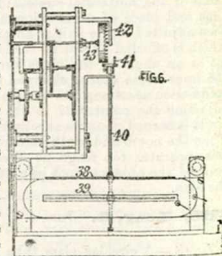
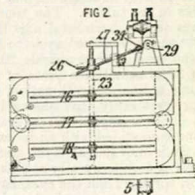
**2438. Steinle, O.** June 19.

*Pyrometer.*—A bar of graphite G enclosed in a tube is connected by means of a perforated inner tube D with the pointer R. The scale B is carried by an outer closed case A, which at its lower end is attached to the perforated tube C; this works at its upper end in guides near K and supports the indicating mechanism. Any variation in the length of tube enclosing G is communicated to the tube D, and so to the indicator, by the bar of graphite, which only varies to a small extent under considerable changes of temperature. The tubes C and D maintain a uniform temperature and length. The instrument can be adjusted by loosening the screw S and setting the indicator by means of a key.



**2467. Shepherd, C.** June 20.

*Telescope.*—The electric clock described below is stated to be applicable for driving telescopes. In the secondary clocks, controlled by the pendulum, the escape-wheel 42, Fig. 6, is driven by a pin 41, fixed in a collet attached to an arbor 40 which carries two bar magnets 38, 39, capable of revolving freely, one in the slot of the coils and the other above the coils, when the circuit is completed. These magnets revolve synchronously with the magnets in connection with the pendulum. The arbor 40 may be connected to the escape arbor 43 by

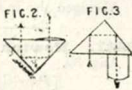


ordinary bevel gearing. Two springs press against the escape-wheel arbor to prevent the wheel from moving except when acted upon by the pin 41. Any ordinary clockwork train may be used. The clockwork may be driven direct from the arbor 23, Fig. 2. The arbor 40 is connected to the escape-wheel arbor by ordinary bevel gearing when the clock is arranged for driving a telescope.

Abridged also in *Class Watches &c.*

**2478. Potter, T. J.** June 21.

*Telescopes.*—To diminish the length of the instrument and increase the field of view the erecting lenses are replaced by two rectangular prisms, cemented together by the base, at right angles to each other. To the half of the prism facing the object glass a plano-convex lens of long focus is cemented, Fig. 2; this lens enlarges the field of view. A second plano-convex lens is cemented to the prism facing the eye, Fig. 5. The course of a ray of light through the prisms is indicated by the dotted line. The prisms are fitted into a cylindrical box having a movable cap into which the eye-pieces are screwed; they are brought in and out of use by turning the cap round.



**2630. Cetti, E. J. M.** July 1.

[*Provisional protection only.*]

*Glass tubes for thermometers &c.*—Tubular or other forms of clear glass are manufactured at one process with a partially or wholly enamelled or coloured external surface, upon which graduations can be marked with great facility.

Abridged also in *Class Glass.*

**2888. Reynolds, W. F.** July 19.

*Magnetic compasses.*

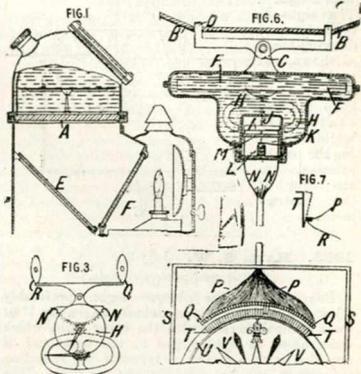
*Binnacle.*—This and the compass are made in one, with a glass plate A, Fig. 1, between.

*Lighting.*—Light is reflected from a lamp F, Fig. 1, by a reflector E through the plate A. The lamp is fitted in the card chamber, either above or below the card, when the compass is to be kept low.

*Errors, detecting &c.*—When the top of the compass is flat an instrument for determining the bearing of the sun &c. is fitted thereon. This consists of a vertical disc H, Fig. 3, with a pointer for moving over the hour scale. A rocking frame N carries a rack gearing with the pinion of a pointer moving over the declination scale on the disc H. The frame N carries an eye-piece Q and disc R. The frame is set for the declination of the heavenly body under observation.

*Errors, detecting electrically.*—A compass is placed outside the influence of local attraction and connected electrically with a compass on deck. The compass may be suspended between two masts by a rope B, Fig. 6, a centre C and loops D acting as gimbals; a buoyed needle F is attached to a bent magnet H, which moves a needle I inside a dry chamber. This needle I is on a staff J supported

on the spring armature K of the electromagnet L. In the chamber is an insulating-disk M, through



perforations in which the terminals of 120 (*sic*) wires are passed. These wires are arranged in four groups, the first in each group being connected to the first line-wire P, the second ones to the second line-wire, &c. The 45 wires P pass to 45 electro-magnets Q in a box S on deck. A wire R, Fig. 7, completes the circuit in each case. Opposite each of the magnets Q is an upright armature T with a lip bent forward, Fig. 7, and projecting over the ring U. The compass dial V turns inside the ring U, and is held in four positions by a click. For taking an observation, the electromagnet L is put in circuit by pressing a key, the needle I thus falls on the terminal which it happens to be over, and the corresponding electromagnet Q is actuated. The needle I is wide enough to cover two terminals, so that if it happens to fall over two, two of the electromagnets Q will attract their armatures and uncover the ring U, and show a mark to serve as the lubbers' line. If one armature is attracted the centre of the space shown is taken as the lubbers' line. By this means 45 wires will show 90°.

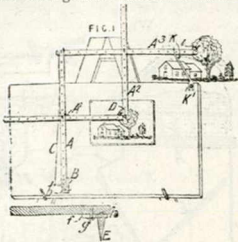
*Gimbals &c.*—The pivot of the card G, Fig. 4, is fixed to a bent bar T suspended in the case S. One end a of the bar T serves as the lubbers point.

Abridged also in *Class Electricity &c., Div. III.*

**2952. Humphries, W. F.,** [Thom, J.], July 24.

*Pantograph.*—The four bars A, A<sup>1</sup>, A<sup>2</sup>, A<sup>3</sup> are joined in the ordinary way; the base of the instrument B is secured to the drawing-board by a thumb-screw b. The tracing and marking points E are provided with slotted

flanges and projections and are secured to the bars by screws *g*. In sketching from nature the bar *A* is provided with a sight *i*. The sight *K* is fixed to the drawing-board as shown, and enables the observer to keep the eye stationary while following the point *i* attached to the arm of the instrument.



**2963. Hart, G. W.** July 25.

[Provisional protection only.]

*Range-finder.*—The oblique sight, preferably telescopic, is set to some definite angle, say  $1^\circ$  or some decimal thereof, with the other sight, which slides along at right angles to the base and is provided with a prism or reflector for reflecting the object into the field of the telescope. The distance of the object is read off on a scale on the base.

**2993. Clark, A. M.,** [*Némitz, H. B.*] July 27.

[Provisional protection only.]

*Magnetic compass cards or needles, barometer dials, and thermometer and other scales* are rendered luminous by phosphorescent or other substances which emit light after previous exposure to light. The indications are marked on a plate of glass or transparent material. They may be opaque and the rest of the dial luminous, or vice versa. The hands or other index may also be self-luminous. The back of the dial &c., or the front of another plate of glass &c. applied behind the dial, is coated with a mixture of varnish and phosphorescent salts.

Abridged also in Classes *Paints &c.*; *Registering &c.*; *Watches &c.*

**3062. Foerste, A.** Aug. 2.

[Provisional protection only.]

*Graphoscopic appliance.*—The frame, stand, or case for containing the picture has a hinged lid, provided with a convex mirror which shows an enlarged reflection of the picture, when the latter is placed at the proper angle in the case. For a photographic album, the case is furnished with a false bottom having in front a narrow flap to turn down, on which it can be adjusted and supported in the desired position relative to the mirror.

**3173. Surman, J. G.** Aug. 12. *Drawings to Specification.*

[Provisional protection only.]

*Telescopes for submarine boats.*—A "floating observing glass" is mentioned constructed so

that the occupants of the boat can "see through" many feet under water."

Abridged also in Classes *Ships &c., Divers I. and II.*

**3335. Fox, H. B.** Aug. 24.

[Provisional protection only.]

*Telescopes.*—A tube of suitable length, made of some flexible material, is provided with ring fittings into which the object glass and eye-pieces are screwed. When not required for use it is doubled up.

Abridged also in Class *Umbrellas &c.*

**3441. Newton, H. E.,** [*Laverne, A. L.*] Aug. 30.

[Provisional protection only.]

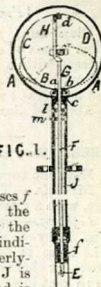
*Magic lanterns.*—The case of the reflector is formed of a cylinder of sheet iron fitted at the base with a regulating-plate. At the upper part of the case a short tube is provided by which the operator can examine the flame. The fittings which carry the lenses and that into which the lens case is placed are perforated to allow a current of air to pass and carry off the heat. The outer casing of the instrument is also perforated at its upper and lower part with the same object.

Abridged also in Class *Toys &c.*

**3522. Ducomet, J.** Sept 5.

*Temperature, apparatus for indicating.*—The fusion or evaporation of a substance is utilized for this purpose. Discs of metals or alloys *f*, fusing at different temperatures, are attached in order of fusibility to the lower end of a rod *E, F, G*, the upper end of which (formed with a rack *H* actuating an index) is fixed to a circular spring *B, C, D* by the screw *d*. By the weight of the discs *f* the spring is bent as shown by the dotted line, and on their melting the spring is released and the index indicates the temperature on a properly-constructed scale. The envelope *J* is made of metal or earthenware and is pierced with several holes *l, m*, thus allowing a current of air to pass and prevent heating. The temperature may be indicated by the evaporation of a suitable liquid contained in a cup attached to the rod at *E*, or instead of discs pins of fusible metal may be fixed in holes in the rod *E*. The index may be attached directly to the rod *F*, which in this case works against a coiled spring, the scale being engraved on the outer case *J*. An alarm may be adapted to this instrument.

Abridged also in Class *Fire, Extinction &c. of.*

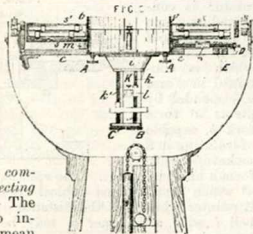


**3601. Witherspoon, J.** Sept. 11. *Drawings to Specification.*

*Barometers.*—Relates to the cases of Fitzroy barometers. A small door is made in the side or back of the frame, to enable a plug to be fixed in

the cistern when the instrument is required for transit. The door is preferably made to close against a beading, to prevent dust entering the interior.

3738. **Abel, C. D.**, [Peichl, J.]. Sept. 21.



*Magnetic compasses, correcting errors of.*—The object is to increase the mean directive force of ships' compasses, and at the same time to correct the quadrantal deviations and under certain conditions the heeling error; by using also some means for correcting the semicircular variations the apparatus may be made to indicate the correct magnetic course. The simple "intensity multiplier" consists of a system of radially-arranged soft iron bars, cylinders, or balls of equal inductive capacity, their longitudinal axes lying in the horizontal plane of the compass card. The bars lie at equal distances from each other and from the centre of the whole system. The entire system is mounted within the gimbal ring of the compass. The quadrantal deviations, and in part the heeling error, may be corrected by the intensity multiplier, in which case the system of soft iron bars is inclined to the plane of the compass card. If the system is rendered independent of the pitching motion of the vessel while the compass bowl remains in a normal position, the one part of the heeling error will be corrected. A further modification is produced by arranging the bars in such a way that the line drawn through the inner end forms an ellipse. A double system of bars may also be used. Fig. 6 shows a compass provided with the universal compensation. The bowl *b* lies in a concentric recess in a base-plate *c*, and can be shifted three degrees to the right or left of its normal position, on relieving the clamping-screws *A, A*. Under the plate *c* and centrally under the compass is a truncated cone *i*, to which is attached the mechanism for compensating the semicircular deviations. By means of a nut *B* the magnet box *l* may be moved up or down or fixed in any position on the vertical screw *k*. In the same way, by turning *C*, the two upper side magnet boxes can be moved up or down on the screw *k'*. The box *l* stands at right angles to the upper side magnet boxes, and can pass between them. A radial slide is attached to the concentric ring *m*, in the groove of which the nut *o* can be adjusted by a screw. This slide moves laterally on a concentric-slotted frame, and is fixed therein by pinching-screws *E*. To the nut *o* are attached two curved rods which are attached respectively to the plates *S, S'*. By shifting the nut *o* towards *D* the

two systems of bars, attached to the plates *S, S'*, are turned equally in contrary directions, until, if desired, bars of each plate are at right angles to each other. When adjusted to this position, the two systems together represent a simple intensity multiplier. A maximum quadrantal deflecting-power may be produced by bringing bars of each system over each other; this is produced by shifting nut *o* towards the bowl *b*. The heeling error is corrected by a vertical magnet *y* attached to an endless chain and adjusted by a clamping-screw *K*. Instead of a double system of bars adjustable relatively to each other, the correction may be made by a modification of Airy's corrector. Two brass rings are arranged concentric with the centre of the compass and rotatable round the box; each ring has at two opposite points a receiver for holding a ball or cylinder of soft iron. The dimensions and inductive capacity of the ball are all equal. The two rings with the pairs of balls can be fixed in any position by means of suitable clamping-devices. The application of these compensating-devices to fluid compasses is described and illustrated. Each means of correction may be used separately or in combination with one or more of the others.

3785. **Coningsby, R. J.**, and **Grover, A.** Sept. 25.  
*Magic-lantern slides.*—A very thin casting of plaster of Paris is made in moulds of wax or like substance, and rendered transparent by immersion in the bath of wax &c. Or semi-transparency is produced by saturating the casting with water or other liquid, with which scent or disinfectant may be mixed. The castings are secured between sheets of glass, the spaces at the edges being filled up with the plaster or other substances; or they are fixed to glass, and several transparencies combined. Stained-glass coverings may be used, or the pictures may be impregnated with colours; or coloured tissue paper or the like is fastened to or arranged as a blind against the back of the casting.  
 Abridged also in Classes *Artists' instruments &c.*; *Glass*; *Printing other than letterpress &c.*; *Toys &c.*

3855. **Engel, F. H. F.**, [Plath, C. C.]. Sept. 30.

[Provisional protection only.]  
*Magnetic compasses, correcting heeling errors in.* Bars of soft iron are arranged athwartship in the vicinity of the compass, and are connected by means of levers &c. with one or more pendulums. The bars, when the ship heels over, are raised and inclined by the action of the pendulums in the opposite direction to the heeling. The elevated end becomes a south, and the depressed end a north, pole. This polarity is the same as that of the soft iron masses of the ship and, as the elevated poles of these magnets are on opposite sides of the compass, the heeling error is corrected, if the magnets are in effect of equal strength.

3927. **Ryan, J.** Oct. 5.

[Provisional protection only.]  
*Plumb indicator.*—In a flat wooden frame is mounted a lever, the lower part made of some

heavy material and the upper forming a pointer ranging over a fixed scale. The scale is read through a sliding opening in the outer case.

**3955. Kimberley, W.** Oct. 8. *Drawings to Specification.*

*Compasses and calipers.*—In place of the quadrant piece the legs are fixed at any angle by means of a thumb nut working on the pivot.

Abridged also in Class *Registering &c.*

**4062. Tydeman, E. M. T.** Oct. 14.

[*Provisional protection only.*]

*Lenses.*—Forming achromatic lenses of only one sort of glass. To more completely eliminate the chromatic dispersion of achromatic lenses, the elements of the combination are made of only one sort of glass, (e.g. flint), but of different densities and refractive indices.

Abridged also in Class *Photography.*

**4079. Pulvermacher, J. L.** Oct. 14. *Drawings to Specification.*

Relates to a translucent medium for reflecting, refracting, and diffusing light, and consists in coating the interior surface of the glass, crystal, mica, or other material with a layer of fine metal, preferably platinum, by chemical deposition and subsequent solidification. The application to reflectors is mentioned.

Abridged also in Classes *Furniture &c.; Glass; Lamps &c.*

**4213. Wells, W. H.** Oct. 22.

[*Provisional protection only.*]

*Telemeters; surveying-telescopes.*—A vertical space formed by lines on glass or by spider's threads is so adjusted in the diaphragm that, when in focus on the object glass, the space will contain a certain length of the levelling-staff, when the latter is placed at a given distance. The distance of the levelling-staff can thus always be obtained by noting the length of the staff included in the space.

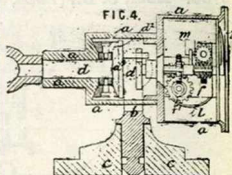
**4217. Wilkinson, A.** Oct. 22.

*Reflectors, manufacture of.*—A metal surface is coated with a plastic composition consisting of earthenware or China clay, nitrate of bismuth, nitrate of silver, mercury, and blue coppers, ground and mixed together, the metal being corrugated or perforated to prevent the coating from collapsing &c. Having been fired, the coated bodies are cooled, and afterwards dipped in a liquid formed by heating together mercury, nitrate of silver, tin foil, and nitrate of bismuth. When sufficiently hardened the surfaces are glazed. Powdered bronze may be dusted on the first coating whilst still plastic. Or the bronze may be mixed with the first-named ingredients, and the articles plated in an electro bath. Sometimes they are overlaid with gold or silver leaf, which is then coated with a suitable adhesive substance, the surface being afterwards dusted with powdered glass, borax, and lead ashes, and subjected to great heat.

Abridged also in Classes *Advertising &c.; India-rubber &c.; Lamps &c.; Metals and alloys; Moulding &c.; Ornamenting.*

**4369. Walker, T. F.** Oct. 30.

*Log.*—The rotator is connected by a line to the spindle *d* of the indicator which is contained in a case *a*, suspended by pivots *a'* to a fork *b*, capable of rotating in a socket *c*, so as to form a universal joint. The spindle *d* has a flange *d'* which bears against conical friction rollers *d''*. A pointer *2* indicates the distance on a dial, and a bell *l* with a hammer *m* may be operated at intervals.



**4454. Mewburn, J. C., [Post, J.]** Nov. 4.

*Barometer.*—To use an indicating-balance as a barometer, adjusting-weights are so set as to make the centre of gravity nearly coincide with the fulcrum. A thin metal ball void of air is put in place of the scale-pan so as to rise and fall with variations in atmospheric pressure. Or, the cap of an aneroid barometer may be screwed on to the end of the lever and by its variations will shift the distance of its centre of gravity from the lever fulcrum and so affect the index.

Abridged also in Class *Weighing-apparatus.*

**4561. Larne, J.** Nov. 11.

[*Provisional protection only.*]

*Thermometers.*—These are combined with pen-holders, pencil cases, and pencils by being inserted in grooves in the holders, or the thermometer tube may form handles in which the pencils, pens, &c. are fitted.

Abridged also in Class *Writing-instruments &c.*

**4654. Lüdeke, H.** Nov. 16.

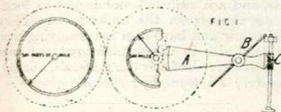
[*Provisional protection only.*]

*Indicating ship's course and speed.*—A vaned wheel, actuated by the ship passing through the water, registers its number of revolutions in a given time and also communicates a sliding motion to a brass bar connected with a straight spring parallel to the ship. Attached to a compass needle is a thin plate of light material on which the deviations of the ship's course are registered by a pencil fixed to the spring.

**4688. Hancock, E.** Nov. 19.

*Measuring angles, distances, and ranges.*—The base-plate is formed with a right angle which is bisected by a fixed mirror provided with sights for adjusting the instrument at right angles to the line of observation. To a movable mirror *B* is attached a segment of a circle of  $22\frac{1}{2}^\circ$  or a partially-toothed

wheel, which moves with it. The toothed segment is actuated by a worm C and in turn gears with a



pinion which communicates motion to the pointer of the first dial. Having adjusted the instrument, the movable mirror is turned until the object appears in the centre of the fixed reflector. The angle at the object can then be read off on the dials in degrees and parts of a degree, and the corresponding distance obtained from the tables, or these distances may be engraved on the dials. These ratios will depend on the length of base to which the instrument is constructed. The apparatus may be supported when in use by a tripod pedestal.

**4802. Waring, W.** Nov. 26.

[Provisional protection only.]

*Ships' logs.*—A flywheel is interposed between the propeller and the counting-apparatus, to equalize the motion of the cord connecting the two parts. Suitable hooks are provided on the wheel for connecting with the cord and counting-gear.

**4880. Clark, A. M.,** [*Monot, Monot, & Stumpf*]. Nov. 29.

*Lenses and reflectors.*—A reducing-gas, such as hydrogen or coal gas, is employed in blowing the glass, and by its action on the metallic oxides or salts contained in the glass reduces them to a metallic state on the interior surface.

Abridged also in *Class Glass*.

**4928. Ainsley, H. R., and Grant, A.** Dec. 3.

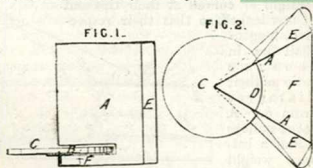
[Provisional protection only.]

*Magnetic compasses.*—Correcting deviations due to the iron in the ship. Consists in fitting into the bowl a similarly-shaped bowl of insulating-material.

**5109. McIlvenna, C.** Dec. 13.

*Kaleidoscopic appliance.*—Adapted for stage purposes, such as transformation scenes, &c. The tube is dispensed with, and the images are seen by means of one or more pairs of vertical mirrors A, A,

which meet at an angle of  $60^\circ$  and are attached to a stout framework F; the objects to be reflected



are placed upon one or more trays or discs C, the centres of which are in line with the junction of the mirrors, and which revolve on the pivot B. This pivot is fixed to the framework F, which forms a stand for the apparatus and is strengthened by the side wings E, these serving also to hide the edges of the trays C. The mirrors are open above and in front, and between each pair a horizontal plate D of glass, tin, &c. is arranged over the trays, so as to give the appearance of a complete circle, and conceal the tray edges.

Abridged also in *Classes Buildings &c.; Toys &c.*

**5166. Smith, T. J.,** [*Despres C.*]. Dec. 16.

[Provisional protection only.]

*Magnetic compasses.*—Illuminated dial plate. The arrangement is described for a night clock. Two glass discs are used, one of which constitutes the dial plate and is opaque with transparent figures or *vice versa*, while the second disc is placed in front or at the back of the dial plate and constitutes the movable transparent hand or indicating needle. This disc is provided with teeth on its periphery and is operated by suitable gearing from mechanism in the base of the apparatus. The circumference of this disc is transparent so as not to hide the figures on the dial plate, the remainder being opaque with the exception of the hand space. A lamp and a reflector are provided for illuminating the dial, the whole being enclosed in a box so that no light can escape except from the dial.

Abridged also in *Classes Registering &c.; Watches &c.*

**5188. McCarthy, W. H.** Dec. 18.

[Provisional protection only.]

*Fitzroy barometers* are rendered portable by adapting to them a cistern with a leather bag and screw fittings.

A.D. 1879.

**45. Prescott, W. C., and Simonds, G.** Jan. 4.

*Copying-apparatus.*—For the reproduction of sculpture and other solid objects either to the same size or enlarged or reduced. The apparatus consists of two tables A capable of revolving on their axes, attached to a framework. When at

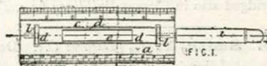
work the tables are caused to turn through the same angular space, either by the use of a vernier scale or by so connecting them that they must revolve together. At the end of the framework is an upright at the top of which is attached an arm B arranged so that it can rotate in any direction round b. This rod carries two or more pointers C,

which move so as to remain parallel to each other and at right angles to B. These pointers may be straight or curved at their tips and of any length, so that their respective lengths shall be in the same ratio as their distances from b. A set of pulleys g and a balance weight are adjusted

so as to give the arm B any necessary motion. When it is required to produce a copy of the same size as the original, the arm B is placed vertical and the pointers work on a cross-bar (at right angles to B), which is held in a sliding frame capable of vertical motion; the cross-bar can turn round its own axis, and the pointers are of equal length.

Abridged also in Class Wood &c.

**50. Spear, J. W.** Jan. 4.



*Combined rule, pen, eraser, &c.*—The instrument contains a parallel ruler, rule, pencil or crayon case pen box, and eraser, and can also be used as a paper knife. *a, a* is a rectangular rule having English and French or other measurements marked on its edges, one or both of which are beveled so that the rule can be used as a paper knife. In the middle of the rule is a rectangular slot *c* in which is pivoted a tubular case consisting of two tubes *d* and *e*, the latter sliding in the former. Both tubes have rectangular slots extending through nearly their whole length, and *e* has two pivots, one working in a bearing at the end of the slot *c* and the other pressing through a bearing to the outside of the other end of the rule, where it carries a pen box *i*, the tubular cap of which has a piece of eraser or rubber attached to its inner end. The small case *i* forms a handle to the instrument, by turning which the slots in *d* and *e* may be brought opposite one another, thus allowing a pencil or crayon to be removed or introduced. The opening and closing of this case may be effected by other means. Rollers *l, l* on pivots allow the article to be rolled about, and serve as a parallel ruler.

Abridged also in Classes Boxes &c.; Registering &c.; Writing-instruments &c.

**57. Glendinning, J.** Jan. 4. *Drawings to Specification. Disclaimer.*

*Rulers.*—School desks are formed with grooves in the sides of the book receptacles, so as to receive a short partition that may also be used as a ruler.

Abridged also in Class Furniture &c.

**104. Richmann, H., and Arnold, U. K.** Jan. 10. *Drawings to Specification.*

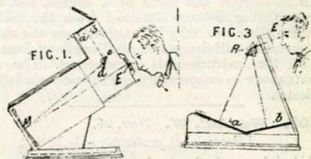
*Tripod stands*, described particularly with regard to stands for rock drills. The body of the stand is formed in two parts, secured by screws which pass

through the clamps and attach the forked ends of the legs thereto. The lower parts of the legs are tubular, and are adjusted and locked by lock nuts on screw threads on the upper parts. They are pointed below and have lugs for steadying weights.

Abridged also in Classes Air and gas engines; Hand tools &c.; Medicine &c.; Metals, Cutting &c.; Mining &c.; Photography; Steam engines.

**164. Grubb, H.** Jan. 15.

*Stereoscopes.*—The pictures, if transparent, are placed as in Fig. 1, at *a, b*, and illuminated from above; the rays are reflected at right angles by the prisms *c, d*, each having a face made convex to act



as a lens and direct the rays on the concave mirror M. The rays are then reflected to the eye of the observer at E. The lenses may be separate from the prisms, or mirrors may be used instead. In the arrangement shown in Fig. 3, the pictures *a, b* are placed horizontally, and a pair of prisms R mounted at such angles that the observer at E sees the images in apparently the same position.

**198. Severn, H. A.** Jan. 17. *Drawings to Specification.*

*Magnetic compasses.*—Relates to means for indicating any deviation that may occur, between limits, from the prescribed course of a vessel at sea. The deviation is indicated by an audible or visible signal at any convenient part of the vessel. An arm or contact-piece, carried by the compass card, operates (in combination with one or more adjustable insulated arms or contact-pieces, carried by the compass lid or bowl and connected to an electric circuit in which is included a bell or other signal) to give the audible or visible signal. The compass card is in connection with one pole of the battery through its insulated stem; the two adjustable arms pivoted in the centre of the glass lid of the compass box, being adjusted to the limits allowable, any deviation of the compass needle beyond the assigned limits brings it into contact with the contact-piece of one of the arms, to which the other battery pole is connected, and actuates the signal.

Abridged also in Class Electricity &c., Div. III.

**334. Blamires, J.** Jan. 27.

[Provisional protection only.]

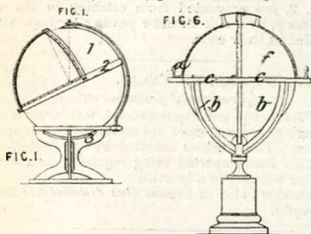
*Reflectors.*—For detecting faults in loom warps, but also applicable for facilitating the inspection of movable and fixed parts of other machines. When applied to looms, a glass or metal reflector is mounted upon adjustable supports and placed so that the weaver at the front may see the back of



the heads and of the warp. A similar reflector is also placed at one end of the loom for giving a view along the open shed.

Abridged also in *Classes Fabrics, Dressing &c.; Metals, Cutting &c.; Railway &c. vehicles; Road vehicles; Spinning; Weaving &c.*

**518. Brewer, E. G.,** [*Eichens, F. W.*] Feb. 10.



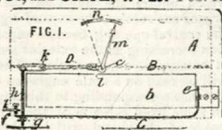
*Astronomical apparatus for navigation &c.*—A globe, which is free to move in any direction, is marked with the equator, poles, equinoxes, &c., and also the constellations. At the top of the stand 3, Fig. 1, is pivoted a curved arm, the upper part carrying a small cap which retains the globe in position. The upper part of the graduated circle 2 represents the true horizon of the place; it is provided with a spring and set-screw. The half-meridian circle is joined at right angles to the horizon circle. At the middle point (the zero) of the half circle is a pivot round which turns a quarter circle of the same radius representing the vertical of the star. At its lower extremity the quarter circle slides against the horizon circle, to which it can be fixed by a set screw. In Fig 6, the horizontal circle *c, c* rests on supports *b, b* and the globe *f* turns on an axis coinciding with that of the earth. A half circle, a little larger than the one carrying the globe to which it is fixed, has in the middle a pivot coinciding with the vertical of the place and round this pivot two quadrants turn. The quadrants are divided from  $0^{\circ}$  to  $86^{\circ}$ . This apparatus may be arranged to give angles and arcs to nearly  $2^{\circ}$ . In this case it will be composed of a globe, a metro-globe consisting of a horizontal circle, and a half-meridian, of a vertical and a support, but to this must be added pieces to ensure the exact passage of the meridional line through the pole and resting points, allowing slow movements to be given to the metro-globe by means of screws. The system may be applied to celestial globes for school instruction.

Abridged also in *Classes Registering &c.; Writing-instruments &c.*

**563. Gilmore, J., and Clark, W. R.** Feb. 12.

*Thermometer.*

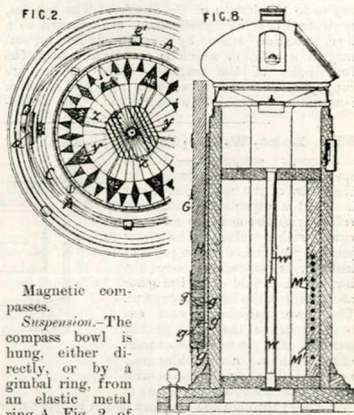
The invention relates primarily to thermostatic apparatus for ventilating &c. A box A, which may be let into the wall of the room &c., has in its lower part an opening *b* into



the room &c., and the upper part has an opening to the exterior air. The bent bimetallic spring *G* is fixed at *e*, and is supported on a collar *g* screwing on a rod *h*, which is attached to a lever *D* centred at *k* and moving with a crank arm *l*, on the axis *c* of a valve *B*. A pointer *m* on the axis *c* indicates the temperature on an arc *n*, and also shows whether the valve is open or shut.

Abridged also in *Classes Cooking &c.; Fire, Extinction &c. of; Heating; Hollow-ware; Hydraulic machinery &c.; Metals, Cutting &c.; Ships &c., Dir. I.; Ventilation; Wearing-apparel, Div. I.*

**679. Thomson, Sir W.** Feb. 20.



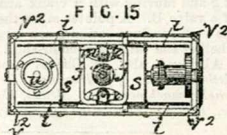
Magnetic compasses.

*Suspension.*—The compass bowl is hung, either directly, or by a gimbal ring, from an elastic metal ring A, Fig. 2, of an elliptical figure, preferably consisting of a single brass wire core, round which a second brass wire is coiled for about six turns. The ring has two sockets *a* fixed at the ends of its long diameter, which rest on two balls upon brackets attached to the rim *D* of the binnacle. The knife-edges of the gimbal ring *C* are supported on grooved stirrups hung by chains to the saddle pieces *e'* on the elastic ring at the ends of its shorter diameter.

*Errors, correcting.*—For correcting the semi-circular error, magnets are arranged in holes bored horizontally in the binnacle or in any convenient solid support. These holes are preferably bored at such distances from the needles of the compass card that the correcting force caused by moving a magnet may be the same at different levels. One set of magnets *M', M'*, Fig. 8, is used to correct the thwartship component, while two sets may be used for the fore-and-aft component of the ship's magnetism. Each series of holes is marked with a scale, and the magnets are kept in their places by covers secured by lock and key. In the receptacle *G*, fitted to the binnacle, a bar of soft iron *H* can be placed, the height of which can be varied by pieces of wood *g* or soft iron. The upper end of the bar is preferably above the level

of the needles, in this way correcting that part of the heeling error due to variations in the ship's magnetism. The auxiliary instrument for ascertaining the heeling error consists of two magnetic needles  $i, i$ .

Fig. 15, connected together by a framework  $j$ ,  $j$  and supported on the points  $l, m$  of two columns by means of iridium points  $k, k$  in a line at right angles to the length of the needles. The needles, horizontal before magnetization, are brought to a level position again by an adjustable vertical magnet  $w$ , Fig. 8, which is equidistant from the four poles of the magnets. The needles are supported when not in use on a platform  $s$ , which is raised or lowered by an eccentric. The instru-



ment is provided with a spirit-level  $u$  and is suspended in the binnacle in place of the compass bowl by means of cords passing through the holes  $v^2$ . The vertical magnet  $w$  is raised or lowered by the chain  $w^1$  until the needles rest in their horizontal sighted condition. The chain is then secured by a fork.

*Cards and needles.*—The ends of the needles  $x, x$ , Fig. 2, are prevented from catching in the silk spokes  $y$ , by a silk thread  $z$  passing through holes drilled in their ends.

### 807. Wright, F. Feb. 28.

[Provisional protection only.]

*Photometric gas apparatus.*—A meter, governor, King's gauge, and clock are combined in one apparatus. The clock is actuated by the meter, the motion thus imparted being regulated by a spiral spring working in a barrel.

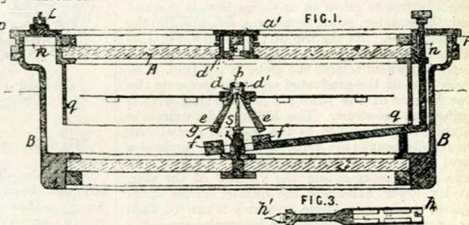
Abridged also in Classes *Gas distribution; Photography.*

### 835. Lake, W. R., [Gareis, A.] March 7.

*Magnetic compasses.*—Relates specially to liquid compasses.

In the centre of the upper glass cover is fitted a capsule  $a^1$  communicating with the compass box and closed with a valve. The screw joint  $p, p$  of the cover, to prevent leakage, is arranged above the level of the liquid  $n, n$ ; the space above allows the liquid to expand. The lower cylindrical part extending below the level of the compass card prevents the access of air bubbles. Air bubbles may be removed by opening the central valve, and additional liquid is

introduced through the aperture closed by the screw plug  $L$ . The agate cap is secured in the holder  $d, d'$  by the screw  $b$ , the holder being screwed into the conical carrier  $e, e$  of the compass card. The lifter is provided with teeth  $f, f$ , and similar teeth project from the lower edge of the carrier  $e, e$ . To remove the cap or pivot pin  $s, i$ , the key  $h, h^1$ , Fig. 3, is introduced through the aperture in the cover, the rectangular slot  $h$  engaging with the pin  $d^1$  or  $i$  as the case may be. When the compass has no lifter, the pivot pin  $s$  is fixed in a screw plug, by which means it can be removed. The outer compass box  $B, B$  is made of smaller diameter, to reduce the weight and allow of the use of compensating-devices. These improvements are applicable to other magnetic compasses.

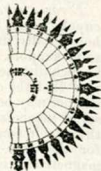


### 996. Hughes, W. March 13.

*Fog-signal compass and code of signals.*—On an inner circle of the card is marked a series of figures representing a code of signals printed on a separate card.

A vessel steering due N. in a fog and wishing to signal its course to other vessels, signals the number 212 corresponding with the north point on the card, by sounding in succession a double, a single, and then a double sound. The phrases in the centre of the card have their corresponding sounds for indicating these particulars to other vessels.

Abridged also in Classes *Signalling &c.; Writing-instruments &c.*



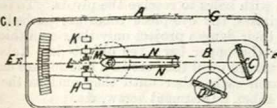
### 1053. Lake, W. R., [Landolt, E.] March 17

[Provisional protection only.]

*Telemeters &c.*—Two similar prisms, mounted within a metal case, are capable of revolution in inverse directions round a common axis by suitable gearing. The prisms are provided with a central opening coinciding with the axis of rotation and equal to half the sectional area of the luminous cone which enters the pupil of the eye. When the prisms are rotated the rays of light passing outside the central opening become separated, this separation increasing as the exterior surfaces are inclined at a more divergent angle. The angle of rotation will be read on a scale engraved on the case. The distance corresponding to this angle, and depending on some fixed relation of the direct and refracted image of the object, will be obtained by reference to tables. Tables are also provided for giving the dimensions of objects at known distances.

## 1061. Scott, E. E. March 18.

FIG. 1.



*Telemeter.*—A rigid base-plate A is provided with sight holes E, F, and G. A radius B is mounted on the base-plate, having a limited movement between two fixed stops H, K, the amount of which may be regulated by the screws L. The radius is preferably moved by means of an eccentric M mounted on the plate and working between two springs N, N fixed to the radius. The mirror C fixed to the radius is half unsilvered, and the mirror D is fixed to the base-plate. These mirrors are so arranged that when the radius is against one of the stops they are inclined to each other at an angle of  $45^\circ$ . Having sighted an object along E, F, and at the same time an object on G, D, the radius is moved up to the other stop and the length of the base line required to bring the object again in view measured; from this the distance of the object is calculated.

## 1073. Dillon, T. A. March 18.

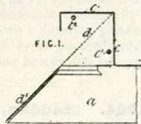
*Graphoscopes &c.* are combined with portfolios containing miniature copies of maps, deeds, &c.; when two hinged covers are raised after the portfolio has been opened the graphoscope and deed &c. are in their proper relative positions. The graphoscope lid may contain a number of single lenses and a binocular arrangement, either of which may be used.

Abridged also in Classes *Books*; *Photography*; *Printing, Letterpress &c.*; *Printing other than letterpress &c.*; *Writing-instruments &c.*

1245. Pepper, J. H., and Walker, J. J. March 28. *Drawings to Specification.*

*Dissolving views.*—By inserting a vertical mirror diagonally into a lantern, the reflected image of one slide is substituted for the image of another.

Abridged also in Classes *Buildings &c.*; *Toys &c.*



## 1246. Milton, C., [Winstanley, D.]. March 28.

*Air thermometer.*—The limb 2 of a U-shaped tube, about 30 inches in length and closed at each end, contains mercury, the other limb 3 air at the ordinary tension of the atmosphere. The tension of the vapour will vary with the temperature and will be indicated by a rise or fall of the mercurial column. In Fig. 6, the limb 2 is provided with a cistern 4 and the limb 3 with a cistern 7 of the same capacity as 4, and an air-bulb 5. The mercury is arranged to half fill



the cisterns 4 and 7, and the upper part of the registering-column in the limb 3 consists of coloured alcohol or ether. The mercury in the controlling-column may be dispensed with, and the necessary pressure obtained by the use of an elastic box such as is used in an aneroid barometer, so placed as to be surrounded by the fluid of the index column. The principle may be applied to a thermograph where the movement of the centre of gravity of the mercurial column is made to actuate a wheel which registers its motion by means of a needle.

1371. Lefèvre, H. April 5. *Drawings to Specification.*

*Magic lanterns,* also suitable as dark chambers. The apparatus consists of an opaque box of any desired dimensions, constructed of pasteboard, wood, metal, or other material. It accommodates two lamps with reflectors and lenses by which images of opaque or transparent objects may be produced. When the apparatus is closed it may in the daytime be utilized as a dark chamber suitable for photographic purposes.

Abridged also in Classes *Photography*; *Toys &c.*

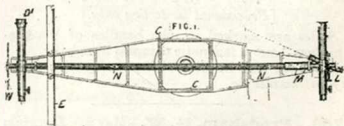
## 1374. Vernon, D. S. April 7.

[*Provisional protection only.*]

*Wind vanes,* electric direction and pressure. The vane is made of two thin boards, and is free to revolve on a fixed steel spindle. The vane boards incline from each other and form an angle of  $36^\circ$  with the end of the centre block on which they are mounted. An insulated electric contact is made with the top of the vane at its centre. In the electric circuit are, say, 32 insulated segments, or contact-makers connected to terminals. Each terminal has its separate circuit to its special electromagnet. A hand in the indicator shows the position of the vane. A spring arrangement, between the vane boards, together with an upper pressure board, indicates the wind pressure. According to the compression of the spring, contacts are made which conduct a current to the indicator. To indicate pressure from 0 to 10, a wheel conductor passes over ten contact-pieces; this arrangement is at the end of the pressure board and communicates with conducting-circles in the above-mentioned contact-maker for direction, and thence (by a separate circuit to each pressure valve) to the series of electromagnets in the indicator for showing wind pressure.

Abridged also in Class *Electricity &c., Div. III.*

## 1391. Haddan, H. J., [Krause, J.]. April 8.

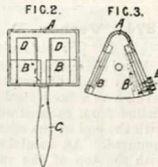


*Telemeter.*—The frame C is supported on a tripod stand, provided with levelling-screws and micrometer work, and is fitted with telescopes D<sup>1</sup> at its ends; that to the left is rigidly

fixed at right angles to the frame and is furnished with two arcs W for taking elevations. The other telescope is movable by the tube N turning on a fulcrum ball immediately below the telescope to the left, so that the telescope remains at right angles to the radius of rotation. The length of N is adjustable by a sliding tube M. In this way the axes of the two telescopes may intersect at any desired point. The distance indicator E, (a graduated scale at right angles to C), is 1000 m.m. from the axis of rotation of a small fixing-telescope L set in motion by a small driving-pin 10 m.m. from the axis of rotation. The telescope to the left is directed to the object, and by means of a set-screw the other telescope is moved until its cross-wires coincide with the object. By the motion of the telescope to the right, the small telescope L is also set in motion, which is a hundred times enlarged on E, the scale on which represents the tangents of the multiplied arcs. The instrument may be used to measure heights, and with the addition of a compass as a theodolite.

**1416. Weldon, F.** April 9.

*Range finders.*—Two mirrors B, B are secured in a frame A so as to produce a deflection of  $88^{\circ} 34' 3''$ , or a prism may be used with its reflecting faces ground to show the same angle. The openings D, D above the reflectors serve for viewing the objects directly. By this instrument an isosceles triangle is determined having its base angles  $88^{\circ} 34' 3''$  and at the apex the object of which the distance is required. In making an observation, two observers face the object and select some point on it to be observed in the angle glass. They turn outwards and note a spot in front of each that coincides with the reflected object, and move in that direction until they reach the estimated length of base. They now move until they get the object reflected on to each other. The base so obtained is measured and is to the distance of the object as 1 to 20. An observation may be made single-handed, by means of pickets, the range being indicated when the object is reflected on to both pickets. The angle of deflection used may be  $87^{\circ} 8' 30''$  which gives a ratio of 1 to 10. The screws at E are for adjusting the reflectors to the required angle.



**1442. Lake, W. R.,** [Fresco, J. A.] April 10.  
[Provisional protection only.]

Scales are marked on the handles of "weale-mefnas" and a magnetic compass attached. Abridged also in *Classes Registering &c.; Writing-instruments &c.*

**1760. Frodsham, G. W.** May 3. *Drawings to Specification.*

*Opera glasses and binocular telescopes.*—The object-glass cylinders are movable about pivots screwed into the bar carrying the adjustment screw,

and at the upper end are fitted with short sliding tubes with holes to receive the pivots. To fold up the glasses, the eye-piece tubes are pushed down until their flanges project only their own thickness above the upper bar; the object-glass tubes are then turned until they are in a line and are made to approach each other until they enclose the eye-piece tubes, adjustment screw, &c.

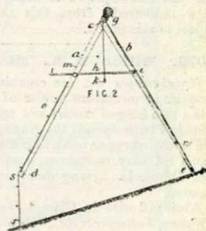
**1778. Haddan, H. J.,** [Abrahamson, S.] May 6.

[Provisional protection only.]

*Eye-glass cord &c. holders.*—A case, made in the form of a medal or other suitable shape, contains a spiral spring wound upon a central pin and having attached to it the cord of the eyeglass. The spring draws the cord into the case when not prevented by a clip, which may be set out of action by pressing a button &c. The case is fixed to the dress by a pin.

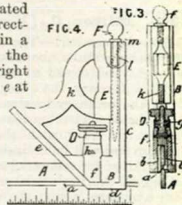
**1862. Haddan, H. J.,** [Kraus, P.] May 10

*Surveying-instruments.*—A portable measuring-staff consists of two legs a, b, hinged at c. A graduated rod h is pivoted at i to one of the legs and works in a guide m on the other. By means of the plummet k or by a spirit-level, the line uniting points e, d (to which h is parallel) may be brought into a horizontal position, the distance between them being indicated by the graduations on h. When not in use the rod h may be secured by a clip n. A measuring-tape o, with a plummet r attached, is secured to the leg a and passing through a groove in a sleeve s measures the difference of level between e, d. The button g may be unscrewed and replaced by a goniometer.



**1964. Haddan, H. J.,** [Starrett, L. S.] May 16.

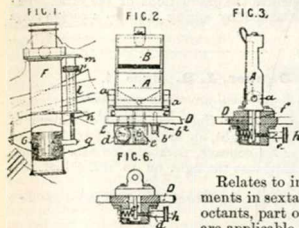
*Try-square.*—A graduated slide bar A having a rectangular groove a, slides in a recess b, formed in the stock B; the side e is at right angles to and the side e at an angle of  $45^{\circ}$  to the lower edge d. The clamp hook C, Fig. 3, engages with the groove a and is worked by the nut D, which is counterbored and provided with a helical spring g to draw the clamp upward when the nut is loosed. A scratch pin F, kept in position



by a friction spring, is used for making gauge marks through scratch holes. A spirit level E is provided with a guard arch *k*.

Abridged also in *Class Registering &c.*

### 1984. Heath, G. W. May 19.



Relates to improvements in sextants and octants, part of which are applicable to telescopes.

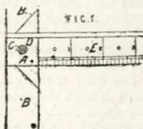
*Horizon glasses.*—The frame A, Figs. 2 and 3, carrying the horizon glass B is supported by means of pivots *a*, *a* on the bed-plate *c*; the latter is pivoted by a fulcrum pin *b* to the limb of the instrument D. The frame A is moved round the pin *b* by a screw *d* working against a projection on the bed-plate *c*, as shown in Fig. 6; motion round the pivots *a*, *a* is effected by a screw *e* working against a projection *f* on the frame A. The key *h* fits on the square heads of the screws *d* and *e* as required.

*Telescopes and opera glasses.*—The eye-piece is made stationary and the object-glass cell G, Fig. 1, is moved in the body of the instrument by a nut *l* with milled head *P*, working between supports *m*, *n* on the body F, and acting on a projection *g*. Or a screw-threaded sleeve held on a flange may be used, which works in a cell with an internal thread. An extra power lens for use during the day, or neutral tint or coloured glasses, are mounted on a bar and brought into use by a lever projecting from the instrument or between the glasses in a binocular.

### 2034. Savage, A. May 21.

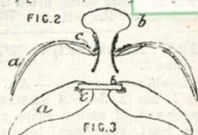
*Combination drawing-square.*—The blade A is movable round a centre C, and can be fixed at any desired angle by a binding-screw D. The angles are set out on the head B as in an ordinary protractor. The blade is engraved with a metrical scale, and is also provided with a series of holes E at determined distances apart, for striking circles or arcs of circles. Or a slot and slide may be provided running the length of the blade; the slide, having a pointer and pencil carrier, being fixed in any desired position by means of a binding-screw.

Abridged also in *Class Registering &c.*



### 2049. Lake, W. R., [Holmes, O. M.]

*Eye-shade.*—Two concavo-convex pieces *a* of coloured glass, ground glass, india-rubber, wood, or other material are connected by a nose-piece *b*, preferably of spring steel. The shading-pieces may be provided with a frame connected by a nose-piece and with a temple bow to hold them in position. They are curved on the inner edge to fit closely to the face under the eyebrows, and may be partly covered with rubber, velvet, &c. for comfort. The connections at *a* are of malleable metal, allowing the instrument to be adjusted by simple twisting. The pieces *a* may be made wider or in two parts. Additional pieces may be fitted on to one or both pieces *a* in the position occupied by the lenses in spectacles, or, in some cases, may be replaced by such lenses.



### 2103. Carlile, W. E. May 27.

[Provisional protection only.]

*Ships' logs.*—The object is to ascertain the speed of a vessel at any given moment without having to heave and draw in the log for each observation. The vanes, by their revolution in the water, cause an impervious flexible diaphragm to be pressed at intervals; each pressure completes an electric circuit and rings a bell on board the vessel; by noticing the interval between these signals, the speed of the ship can be calculated. Or, an electromagnet in the circuit may be made to draw back the armature of a counting or time-recording apparatus, and thus the ship's run and the speed at any hour can be recorded. The flexible diaphragm keeps the water out of the electric chamber. A concave guard, on the electric chamber side of the diaphragm, supports it against the pressure of the water when the log sinks to considerable depths. The circuit-maker is a rod working in loose bearings on a continuation of the diaphragm guard plate; a spring, working between one of these bearings and a collar on the rod, keeps the rod against the diaphragm when retreating, with the bell crank or piston on the other side. On the other side of the bearing, an insulated ring slides on an insulating-collar on the rod and comes in contact with the poles when the rod is pushed up.

Abridged also in *Class Electricity &c., Dir. III.*

### 2130. Colin, E., [Châtelain, F.] May 28.

[Provisional protection only.]

*Combined pencil holder, scale, magnetic compass, and seal.*—A case having a longitudinal slot with a scale attached is provided with a pencil holder at one end and a compass or seal at the other.

Abridged also in *Classes Registering &c.; Writing-instruments &c.*

### 2133. Davis, T. May 28.

*Parallel rulers.*—A triangular scale *a* is mounted on a spindle *b* and end rollers *c* projecting beyond the face of the scale as shown. Each face of the scale may have two different scales with a groove between them for convenience



in lifting. The through spindle may be dispensed with, the scale being fitted with end-caps having gudgeons for the rollers.

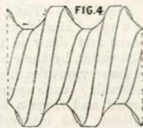
**2185. Nawrocki, G. W. von,** [*Roussel, P.*]. June 3.

*Sounding-apparatus.*—An ordinary log L has a float S attached to its upper end, of such a shape as to offer the least resistance to its passage through the water. The weight G, which may be of stone, is attached to the ring a by a hook b so formed as to disengage itself from the ring a on the downward movement being arrested. A suitable contrivance is used for preventing the mechanism being actuated during the descent. During the upward movement the vanes are rotated, and the distance passed through is registered on the counter and read off when the apparatus is recovered.



**2270. Stevens, G. J., and Smith, J. S.** June 9.

*Dividing-engine &c., screw for.*—A tractrix curve, i.e. one of which the tangents to a given straight line are constant in length, is revolved uniformly round and at the same time moved uniformly along the straight line. A curved screw surface is thus generated of which the trace, if cut by a plane at right angles to the axis, will be a spiral meeting the axis at an angle equal to the angle of pitch at the periphery of the screw. This secondary curve is rotated about and traversed along the axis and, by varying the rate of traverse, a screw surface is constructed of any angle, irrespective of pitch. Other similar spiral curves may be similarly used.



Abridged also in *Classes Air and gases, Compressing &c.; Mechanism &c.; Metals, Cutting &c.; Pumps &c.; Ships &c., Div. II.*

**2275. Bassnett, T.** June 9.

*Sounding-apparatus.*—A small-bored vertical tube with open ends has its lower end in communication with the water. The upper end opens into a glass tube B, hermetically closed at the top by packing and by a valve. Preferably this tube extends about three-quarters of the length of A, leaving an opening into the chamber E. This chamber is hermetically closed below. The usual lead weight is used to sink the apparatus, or an outer heavy metal case M which also protects the instrument will effect this purpose. The apparatus may be enclosed in a very heavy case with a hinged lid at the bottom for obtaining specimens of sand or mud, or a cone is used which sinks into the mud and is closed by washers when the instrument is



drawn up. As the instrument descends the water enters by the tube A into B and then into E, thus reducing the volume of air. The water collected in the chamber E and tube B is an index of the compression and hence of the depth attained; this may be read on a scale or the volume of the water may be ascertained by drawing it off through the four-way cock attached to the upper part of B. The tube B may be taper to more nearly equalize the graduations of the scale. The line is attached by spring clips to two eye-rings H, H.

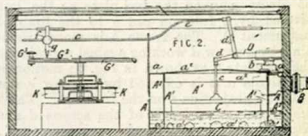
**2368. Dancer, J. B.** June 14.

[*Provisional protection not allowed.*]

*Testing effect of light on colours.*—Instead of using diffused light, an arrangement of lenses or reflectors of a concave, parabolic, or other form is used, to condense the light on to the colour it is desired to test.

Abridged also in *Classes Artists' instruments &c.; Bleaching &c.*

**2378. Adams, J., and Baird, A.** June 16.

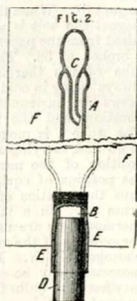


*Anemometers.*—Also applicable for recording the pressure in the air passages of mines, blast furnaces, &c. A tank A, Fig. 2, contains an interior tube A<sup>1</sup> having at the bottom apertures a<sup>1</sup>; otherwise the annular space A<sup>2</sup> is airtight. Over A<sup>1</sup> is a loose cover a<sup>2</sup>. In the tank is a liquid on which is the float C, connected by the rods c and bell crank d, d<sup>1</sup> with a pencil g, which rests on a dial G<sup>2</sup> carried on a metal disc G<sup>1</sup>, rotated by a clock K. The varying pressure of the wind or air acts on the surface of the water, varies the level in A<sup>1</sup>, and the variations are registered by the float C and pencil g on the dial G<sup>2</sup>. The float and pencil may be connected directly or in any other way, and a recording-cylinder may be used instead of a dial. In the modification shown in Fig. 4, a U-tube A filled with mercury and connected by a cock b and pipe B with the source of pressure, is provided in the open limb A<sup>1</sup> with an iron (or other) float C connected by a rod c to an arm d pivoted to a bracket D. On the same axis is a double arm d<sup>1</sup> on one end of which is a partial counterbalance W, and to the other is fitted a holder f and pencil g to record pressure on the paper G, carried by the cylinder G<sup>x</sup> worked by a clock K. Any other convenient connection between the float and pencil may be used, and also a dial instead of a cylinder.

Abridged also in *Class Registering &c.*

## 2472. Buchanan, J. Y. June 20.

*Sounding-apparatus.*—A glass tube A, B is closed at its lower end by a removable plug D, held in position by an india-rubber sleeve E. At the upper end is fitted a flask-shaped vessel C, provided with a central opening for the admission of water, the size of which is smaller than the internal opening. The tube A, B is preferably made of two diameters, the lower being the larger as shown in Fig 2. The tube is fixed to a vulcanite plate F, the whole being enclosed in a metal case to be attached to the sounding-line. As the apparatus descends, the air in the tube is compressed by the water entering through the vessel C; this water collects at the lower part of the tube, and is an index to the amount of compression and hence to the depth attained, which is read off on a suitable scale engraved on the plate F. Discharging the water by removal of the plug D prepares the instrument for re-use.



## 2555. Francis, J. June 25.

[Provisional protection only.]

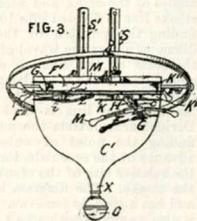
*Graphoscope* for viewing transparent photographs. A hollow tube or rectangular casing, one end of which is fitted with a lens, is provided with a transverse opaque partition with a central opening, in front of which transparent pictures may be passed, from the exterior of the tube. A revolving drum, consisting of two discs with sections of some transparent medium such as glass or gelatine, is fitted in the casing. Two intermediate obscured glass partitions are used to diffuse the coloured light. The tube is closed at its back end with obscured glass.

## 2705. Lake, W. R., [Longfellow, S.]. July 3.

Magnetic compasses.

*Errors, correcting.*

—The compass bowl C' is suspended by gimbals in the usual manner, and has arranged round it magnetic bars F, F', F'', F''' in the shape of segments of circles. Each bar is inserted in a sleeve G attached by a joint c to an arm H which is hinged to an oblong curved plate i. Around the compass bowl are three parallel bands K, K', K'', forming grooves for the reception of the plate i, which can be moved to any position in the grooves. In this way each bar is rendered adjustable circumferentially, horizontally, and vertically. Pear-



shaped pieces of glass or porcelain. Instead of curved bar magnets the bowl may be pitted with a series of closely-placed small radial bar magnets, in which case the needle is formed in two parts, one of steel and the other non-magnetic; the south pole of the needle is thus near the pivot point.

*Bowl.*—The bowl terminates in an elongated neck X, into which is fitted the spindle; to this latter is attached the weight O made in two parts connected by a screw thread and containing removable weights. To the azimuth circle are attached two sockets R into which the sight vanes S, S' are inserted.

*Lighting.*—The cover of the compass bowl is provided with tubular supports in which lamps are fitted and the whole interior surface is nickel-plated for illuminating the card.

## 2876. Moseley, W., and Trumble, T. S. July 15.

[Provisional protection only.]

*Sounding-apparatus.*—A glass tube (having one end hermetically sealed by a spring cushion) is enclosed in a metal case. A float is fitted within the tube and is so constructed that a portion of it is always above the water level, and that when the tube is withdrawn from the water the float clings to the tube and thus shows the pressure. In practice a light float with a feather top is placed above the main float. The apparatus is attached to a steel wire line coiled on a drum and paid out between two pads saturated with grease. The sinking weight is composed of a metal tube filled with quicksilver.

## 3060. Budenberg, A., [Seyferth, A., and Budenberg, C. F.]. July 28.

*Pyrometer or thermometer.*—A closed vessel or pipe A contains a volatile liquid and is connected at its upper end to a pressure gauge B. The vessel A is exposed to the heat and the resulting pressure produced on the gauge B indicates the temperature. An isolating fluid may be placed in a bend D to protect the gauge from the heated vapour. Carbonic acid, anhydrous sulphurous acid, water, heavy petroleum oil, mercury, or other liquid may be used to suit the different ranges of temperature.

Abridged also in Classes *Brewing &c.*; *Heating Registering &c.*



## 3164. Hopkins, E. H. Aug. 6. Drawings to Specification.

*Demagnetizing ships* to prevent deviation of the compass. One or more powerful bar magnets, either electromagnets or permanent magnets, are held in the angle of the magnetic dip and are passed over the surface of the deck immediately above the transverse iron beams from end to end of each beam, taking care to use the same polarity with which the beam is effected, in each case. Plates of iron forming part of the deck are treated in the

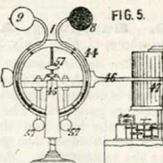
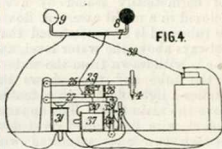
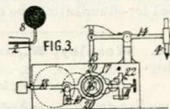
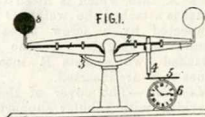
same manner. Vertical portions of the ship's framework are similarly treated, the demagnetizing influence being assisted by hammering those portions whilst they are under the influence of the magnet.

Abridged also in Classes *Electricity &c., Div. I.; Ships &c., Div. I.*

### 3251. Milton, C., [Winstanley, D.]. Aug. 12.

*Sunshine - recorders; radiographs.*—Relates to the application of a differential thermometer to instruments for recording the duration and the intensity of sunshine or other radiant energy. The thermometer is supported on a beam 2 of a balance, which beam, when the sun is not shining, rests on a piece 3. When the sun shines the air in the blackened bulb 8 expands and moves the mercury along the tube, thus destroying the equilibrium and bringing a pencil 4 on to a paper resting on a disc 5, moved by clockwork 6.

When great sensibility is required, the pencil is actuated by auxiliary mechanism, either in the form of clockwork, or by electrical means. Fig. 3 shows the former. The beam 2 of the balance is connected to a lever 18, having two projections 20, which may rest in a notch 17 in a wheel 16. On the spindle of this wheel is a crank with a connecting-rod 13 connected to a rod carrying the pencil. When neither of the projections is in the notch 17 the clockwork 10 moves, but when the notch is occupied by either of them a pin on the end 22 of the bar 18 comes in contact with a fly 11 and arrests the motion. As the beam 2 moves up or down, the clockwork is released from one of the two projections 20, and the pencil is moved either to or from the paper. Fig. 4 shows the electrical method for actuating the pencil: in this case the thermometer is not balanced. The pencil 4 is carried on a bar 25 connected by a spring 28 to a second bar 27 which is actuated by an electromagnet 31. When the pencil is depressed the bar 27 is locked by a spring



bolt 33 which carries the armature of an electric magnet 37. When the current passes through this magnet the bolt is withdrawn and the pencil is raised from the paper. At the same time contact is broken at 38. Three wires are fused into the tube of the thermometer, the middle one 39 always being in contact with the mercury. Fig. 5 shows an instrument for recording both the duration and the intensity of the sun's rays. The tube 1 is mounted on a piece 44 balanced at 45 and carrying a pencil on an arm 46. The position of the mercury in the tube determines the position of equilibrium of the apparatus, and thus the position of the pencil on the revolving drum 47. In a modification, two separate air thermometers are used. In another modification, the position of the mercury in the tube is registered photographically. In Figs. 1 and 5, two thermometers may be combined with the beam, and may have the bulbs full of liquid, in which case the ends of the tubes are open and dip into cups of liquid, or they terminate in reservoirs.

*Thermometers.*—The arrangement shown in Fig. 5 and its modifications may be used as differential thermometers.

Abridged also in Classes *Electricity &c., Div. III.; Photography.*

### 3340. Andrews, W. H. Aug. 19.

[Provisional protection only.]

*Measuring distances.*—Two arms fixed at right angles are attached by a pivot to a tripod stand or gun carriage, so as to turn freely in a vertical plane. The upper arm is provided with a sliding sight, and is graduated to enable the distance of the object to be read off. The lower arm has two sights for the purpose of accurately pointing the instrument.

### 3346. King, J. Aug. 19.

[Provisional protection only.]

*Apparatus for setting and designing slide valves.*—On a diagram is the crank-pin circle divided into 200 parts, outside of which is a circle divided into degrees; this circle is used for setting out the angles of the crank and eccentrics. A horizontal stroke line is divided into 100 parts, and is used for finding the position of the piston. A vertical diameter shows the travel of the valve; arcs from the scale on this line to one half of the horizontal line, which is the lap and lead line, give the opening of the steam port. The first part of the lap and lead line is used for the exhaust lead. Divided arcs outside the main circle are used for finding the point of cut-off and the angle of advance of the eccentric, the arc used depending on the relative size of the crank and connecting-rod of the stroke. The diagram is mounted on a board and has a stud to receive a compass centre; there is also a spindle with a pair of hands, one fixed and the other slotted and adjustable. A complete set also contains curves, a square, a taper piece slotted at each end into which fits a knotted string and a pressure scale.

*Protractor.*—The outer circle mentioned above may be used as a protractor.

Abridged also in Class *Steam engines.*



## 3382. Haddan, H. J., [By, C.]. Aug. 22.

[Provisional protection only.]

*Surveying-instruments; theodolites.*—The limb and the alidade are detachable, and when used for plotting may be fixed on a sheet of paper by adjustable clamps. The alidade preferably has four arms, and turns "without a central pivot inside the limb." One arm carries a scale or sloping edge, which is placed in the line of sight. The zero point is in the centre. Different sized scales may be used

## 3442. Kerby, C. Aug. 26.

[Provisional protection only.]

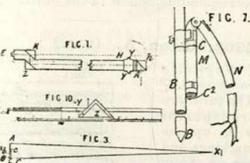
*Lenses.*—A composition for preventing sweating or steaming of lenses is formed of methylated spirit or spirits of wine, glycerine, and any of the essential oils, amber being also added in some cases. The composition is applied to the internal surface of the lens.

Abridged also in Classes *Buildings &c.; Glass; Lamps &c.; Paints &c.; Railway &c. vehicles; Road vehicles.*

## 3471. Holmes, J. G. H., [Holmes, A. L'E H.]. Aug. 28.

*Range-finders.*

—The sighting-instrument consists of a tube with mirrors at K, Z, and h, Fig. 1, inclined at 45° to the axis,  $\frac{1}{2} \frac{b}{c}$  the upper



half of K being unsilvered. The tube is capable of sliding in a collar H which is fixed to the stand by the pieces Y, Y. Inside H is a revolving collar with a peg which works in a spiral groove on the tube, at the edge of which groove is a scale. To measure a distance, A X, Fig. 3, the apparatus is placed at A and a staff at B is sighted. The base b, at right-angles to A X, is preferably taken as 31-607 yards [=  $\sqrt{1000}$  yds.]. The staff is then placed at A and the apparatus at B, and the tube pushed out a distance a until A is sighted; the distance A X will then be indicated by the spiral scale on the tube. As  $a x = c^2 = b^2 - a^2$ ,  $\therefore x = \frac{b^2 - a^2}{a}$ ,

—where x is the distance A X. The scale is so graduated, that for a fixed base it indicates the distance directly. For a short base a micrometer adjustment is used. Instead of setting the staff at A it may be set at any point between A and B, the reading given on the tube being afterwards multiplied by the proper fraction &c. If the angle h is not at 45° to the axis a constant is found. In place of three mirrors only one may be used. In a modification, Fig. 10, two mirrors Y and Z, Y being half the height of Z, are placed at right angles, and are fixed to a long screw rod carried inside a tube, so that the mirrors alone are movable; the instrument is graduated as before. Over the tube is an eye-piece, and over this is a telescope

for the direct vision of X. The tube is mounted on a plate on the stand, and may be moved about a pivot by a screw.

*Stands for range-finders.*—B, Fig. 7, is a vertical central upright in connection with a plumb-line &c. There are three legs N which have parts M hinged to them; the stop C<sup>2</sup> is stopped by C when the part M is pulled up, so that the legs may be strapped to B, when the stand is to be folded up.

Abridged also in Class *Photography.*

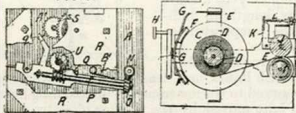
## 3487. Walker, T. F. Aug. 30. Drawings to Specification.

*Sounding-apparatus.*—Inside a tube of uniform bore and closed at one end, is inserted a rod or strip of metal &c. coated with any suitable chemical that is changed in appearance by salt water; the rod or strip is held in place by a perforated cap on the end of the tube. The water enters the lower end of the tube and rises therein a distance determined by the depth, the discolouration of the rod being subsequently measured by a scale marked on the rod, or the rod may be taken out of the tube and compared with a detached scale. For great depths the lower part of the tube may be enlarged by a single chamber or by a number of chambers of different sizes; in this case the instrument has a double conical end. The Provisional Specification describes another form consisting of a tube open at the bottom, into which another tube is placed, which tube has valves opening inwards, at the bottom, so that the water is retained.

## 3629. Clark, A. M., [Gordon, A.]. Sept. 10.

FIG. 3.

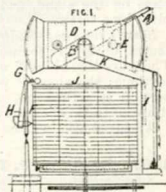
FIG. 4.



*Logs; indicating-mechanism for "log-ship" type.* Figs. 3 and 4 are vertical sections. The box A is held in the hand and the line is paid out from a reel D between india-rubber faced rollers I and J, which are thus revolved. The roller J is carried by a lever K held in place by a spring L. F is a brake acting against the rim of D; it is applied by a pin H, and is taken off by a spring G. The worm N keyed in the axis I gears with a worm-wheel O on a shaft P carried in bearings in a lever Q centred on the frame R. A second worm gears with the wheel U, which is attached to a sleeve surrounding the axle of D. On this sleeve is a pointer moving over a dial showing knots, also a ratchet-wheel which actuates a hammer ringing a gong at every knot run out. The wheel A<sup>1</sup> is driven by clockwork so that the space of one notch is moved through in a quarter of a minute. After the lapse of this time the spring B<sup>1</sup> causes the lever Q to move and the arm q<sup>1</sup> thereon drops into one of the notches in the wheel A<sup>1</sup> stopping the clockwork and withdrawing the worm-wheel O from the worm N. The line is then wound in by a balanced crank on the axle of D. The end of Q projects through a slot in the box, so that A<sup>1</sup> can be released.

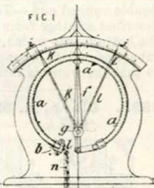
**3680. Airy, H.** Sept. 15.

*Self-recording thermometers.*—A mercurial thermometer A, B is mounted in a cradle D carried by knife-edge supports on the arms K. One end of the cradle supports a pen frame F and the other a counterpoise I. From the end of F is suspended a rod dipping into a vessel of oil; or a spring may be used. A penholder H, carrying preferably a tubular glass pen, is hinged to F. The cylinder J is moved uniformly by clockwork, and has a sheet of paper &c. on it. As the temperature increases the mercury travelling up the tube of the thermometer disturbs the equilibrium. The thermometer tube may be bent and the immersion rod may be suspended from an arm rigid with D, the rod itself having two branches, each being the arc of a circle described by the said arm.


**3712. Bowkett, W. D.** Sept. 16.

*Thermometers and pyrometers of the Bourdon-tube type.* A closed metallic tube *a*, filled with fluid, is fixed at one end *t*, while at the other end it is attached to a pointer *f*. At the centre *g* may be a shaft of any length to indicate the temperature at a distance. For the same purpose a tube *n* filled with liquid may lead from the situation to be observed to the instrument. The sliding buttons *i* and *j* are moved by the pointer *f* or by pointers *k* and *l* to indicate maximum and minimum positions. For high temperatures, the tube *a* is continued at the fixed end *b* into a tube *n* of fine bore which ends in a vessel containing air &c. The tube *n* is cooled by placing around it a vessel of water. The position of the index arc may be altered in accordance with barometrical changes.

Abridged also in *Class Heating*.


**3762. Matton, L. P.** Sept. 19.

*Instrument for dividing arcs.*—The semi-circle M B N has the arcs of circles H K, G L, and X Z. The instrument rests against a rule F, the centre of the arc to be divided being made to coincide with O, and an arc with M N as diameter drawn. If C E be the arc cut off on M A N by the extreme radii of the given arc; then by joining C B and B E, P S will be one third of C E, G L a fifth, &c., so that by drawing radii the original arc is



divided into one third &c. The instrument may be made to divide in even numbers, or both odd and even. The instrument shown is combined with a protractor.

**3769. Hatfield, W.** Sept. 19.

[*Provisional protection only.*]

*Barometers; forecasting weather.*—Around the dial of the barometer is fitted a movable ring, marked with the days of the month. On one end of the index hand is a red disc and on the other a blue. At right angles to this is a second index hand, the two dividing the months into weeks. It is stated that the probable periods of fine weather between the falls of the barometer can be determined by the positions of the discs.

**4270. White, J.** Oct. 21.

[*Provisional protection only.*]

*Spectacles and eyeglasses.*—Relates to spectacles and eyeglasses having divided lenses, and consists in forming the upper part of each lens of a crescent shape, the horns projecting downwards past the centre; the lower portion is oval in shape. Where the two parts meet there may be plain butt edges, or the rounded edge of one part may fit into a corresponding hollow in the other.

**4303. Aron, A.** Oct. 22.

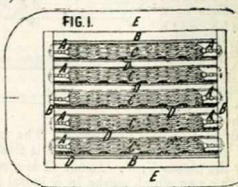
*Magnetic compasses.*—The cards are transparent with opaque markings, and are lit from behind by apparatus which produces light by the motion in vacuo

of certain substances, preferably metals in a finely-divided state. Within glass tubes A are fixed clusters of twisted rods C, and mercury or granular metal having been placed in the tubes and a vacuum produced therein, they are closed. One side of each tube may be opaque to form a reflector, or a separate reflector E may be adapted behind the framework B in which the tubes are mounted. This framework is carried by two rocking arms, to which reciprocating motion is communicated by clockwork or other motive power, causing the metal D to run about in the vessels, it being divided up by the rods C. Modifications in the shape and arrangement of the tubes and of the dividing-rods are described and illustrated in the Specification.

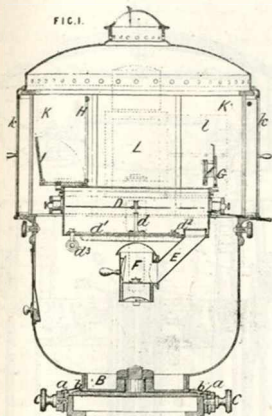
Abridged also in *Classes Lamps &c.; Watches &c.*

**4380. Louttit, A.** Oct. 28.

*Azimuth compasses.*—A lamp F connected with a tube E is used for slightly illuminating the part of the tale &c. compass card D under the eye piece G. The eye piece is fitted with a prism and darkening glasses. The frame H is provided with a central

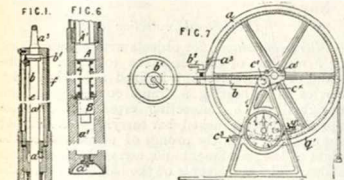


vertical cross wire and a movable mirror I by which the star is reflected to G. The pivot  $d$  of the card



is fixed to a bar  $d$  hinged at  $d^1$  and actuated by a tangent screw  $B$  to bring the pivot into the lubber line. The base B of the compass case revolves over a fixed graduated plate  $a$  and is clamped by the screws C. K is a glass lantern and  $k, k$  sliding doors. The side lights L are darkened during a reading.

**4437. Jones, J. G., and Saunders, J. B.**  
Oct. 31.



Relates to sounding-apparatus of the pressure gauge type.

*General construction; indicating-mechanism.*—An airtight tube  $a^1$ , Fig. 1, is screwed into a tube  $a$  open to the water. The plunger  $b$  passes through the stuffing-box  $a^2$  and to its lower end is connected one end of a spiral spring, the other end being attached to  $a$ . As the plunger descends under the influence of the head of water a pointer is drawn along the scale  $e$ , its ultimate position, which is observed after the recovery of the instrument, determining the depth. The plunger  $b$ , which is made hollow, serves as an air chamber. To adjust the apparatus, and to graduate the scale, weights are hung from a rod which passes through  $a^x$  and screws into  $b$ . The plunger spring may be put in

the bottom of  $a^1$  and arranged for compression. In very deep soundings the pressure on the spring is reduced by having two pistons A and B, Fig. 6, of different diameters. Water is admitted above A and below B;  $A^1$  is hollow and acts as an air-chamber.

*Alarm and signal.*—As the plunger descends it may be arranged so as to make and break electrical or magnetic contact, thus giving signals at various depths.

*Samples of bottom, obtaining.*—The bottom of the instrument is cupped as shown to receive tallow &c.

*Casting-apparatus.*—The casting-line is wound on a drum  $a$ , Fig. 7, the axis of which rests in bearings  $a^1$  near the end of a forked lever  $b$  carried by gudgeons  $c^1$ , and having at the other end a weight  $b^1$  so adjusted as to nearly balance the drum, wire, and sounding-instrument. When the sounding-instrument rests on the bottom, the weight  $b^1$  falls and tightens the brake strap  $a^x$ , thus preventing any more wire running out. The inner circumference of one edge of the drum is eccentric; on it runs a roller  $y^1$ , which works a pawl and ratchet-wheels, and so indicates the number of revolutions of the drum.

**4507. Ryan, J., and Clappison, W. F. N.**  
Nov. 5.

[Provisional protection only.]

*Plumb rules.*—A long needle bar, fitted with a plummet, is pivoted at its upper end on a frame hollowed out on its face for the reception of the needle; at the lower end is an index face. The frame is covered with a plate with glass at the lower end. The whole may serve as a straight-edge.

**4543. Whitaker, E.** Nov. 7.

*Magnetic compasses, cases for.* A disc of metal is pressed into a cup form by suitable tools; the flat bottom is cut out so as to leave a seamless band 2, which is then operated upon with rollers to produce a set level 4 at or near its edges, and the case is finished in the ordinary way.

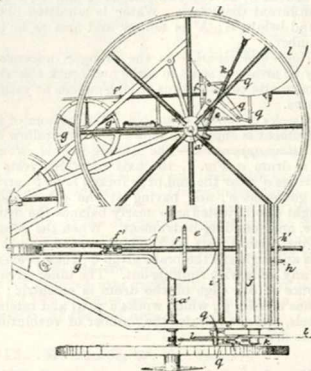
Abridged also in Classes *Advertising &c.; Boxes &c.; Fuel, Manufacture of; Furniture &c.; Harness &c.; Registering &c.; Sewing &c.; Table articles &c.; Tobacco; Toilet &c.; Toys &c.; Watches &c.*



**4739. Rymer-Jones, A. M.** Nov. 21.

*Machine for recording differences of level for making sections &c.*—The machine is propelled over the area to be surveyed and itself plots down the results on a continuous roll of paper. The horizontal plate  $e$  is driven from the axle  $a^1$  and transmits motion to a vertical wheel  $f$ , the axle of which is connected by a swivel  $f^1$  with the edge of a weighted wheel  $g$ . The motion of the axle  $f$  is transmitted to a rack  $h^1$  carrying a pencil  $h$  which rests against paper on a roller on an axis  $j$  worked from the axle  $a^1$ . A change of level in the carriage causes an alteration in position of the wheel  $f$  on the wheel  $e$ , and a consequent change in velocity of the wheel  $f$ . To compensate for the greater length of the hypotenuse than the corresponding base of

an incline, the diameter of the roller on the axis *j* is made to vary, by forming it of a flexible sheet of



metal, which is extended by weighted radial arms with friction rollers, fixed to a collar on the axis *j*. The figure shows another method; a friction-wheel *k*, rotated from the axle *a'*, works against a plate *l* on the axis *j*, the relative positions of the roller *k* and plate *l* being varied by a weight and levers *g*. The recording-part of the instrument may be put out of gear with the wheels.

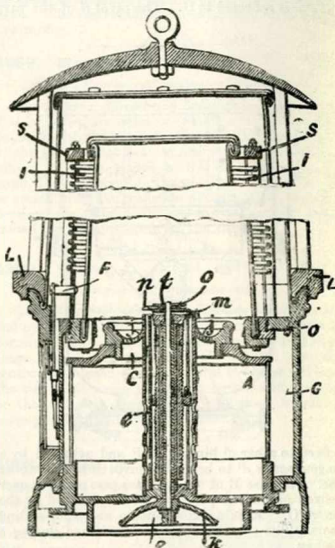
**4754. Brunton, J. D.,** [*Gossiaux, L.*].  
Nov. 21.

*Pyrometer.*—The pyrometer is shown adapted to a miners' safety lamp, in which form it is designed to indicate the amount of heat developed by the lamp, and so signal the presence of fire-damp. A spiral wire is arranged between the inner and outer gauzes of the lamp, its diameter being maintained invariable by fitting it in recesses, or through holes, in each of several columns *I*, which are connected above by a ring *s*; or the spiral may be held between two sets of columns. Its free end is terminated by a tube, which, when the wire expands by the heat of the flame, actuates a lever *F*. This is suitably connected with the hand of a graduated dial, which is displayed at the side of the lamp. A toothed rack may be substituted for the lever *F*. The pyrometer may be used apart from the lamp by suitably graduating it. This is effected as follows:—The lamp is lighted in pure air and *O* marked on the dial at the point where the hand becomes stationary. An iron cylinder heated to redness is then substituted for the lamp and allowed to remain until the first gauze begins to redden, which would also take place if the lamp were burning in atmosphere completely saturated with fire-damp. At the then position of the hand *100* is marked and the intervening space equally divided.

Adapted also in *Class Lamps &c.*

(For drawing see next column.)

4754.



**4803. Hildebrandt, J. A. R.,** [*Schaefer, F.*].  
Nov. 25.

[*Provisional protection only.*]

*Microscope stages*, for objects with large surfaces, or a number of objects taken together. To the stand of the instrument is fixed a bracket which carries in a bearing a frame consisting of two uprights and a connecting cross-bar. In these uprights slides a racked bar carrying in a slide bed the end of a fork, the prongs of which rest on the plate of the instrument and carry the microscopic slides. The movements of the bar and with it the stage are governed by a spring engaging its racked face.

**4894. Müller, M. L.** Nov. 29.

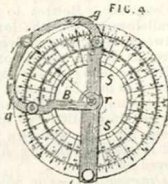
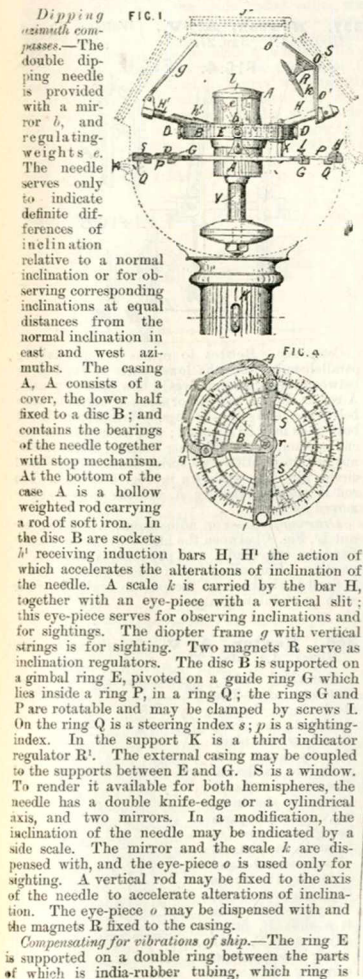
[*Provisional protection only.*]

*Weather glass.*—A suspended gut-cord indicates atmospheric changes by its torsional movements. The cord, which is suspended within a hollow pillar, supports a weighted dial, carrying a graduated scale. A fixed index indicates the oscillations of the dial. A fixed set of graduations corresponding to those on the dial indicates the "difference of change of temperature from any given time." The top of the cord may pass through a sliding plug so that its length may be varied and the oscillation for any given change thereby modified. In another form a graduated scale is marked on a plate of glass &c.

on the top of the case, and instead of the dial proper a weighted disc carrying an index pointer is used.

**5045. Imray, J.,** [*Peichl, J.*], Dec. 9.

*Dipping azimuth compasses.*—The double dipping needle is provided with a mirror *b*, and regulating-weights *e*. The needle serves only to indicate definite differences of inclination relative to a normal inclination or for observing corresponding inclinations at equal distances from the normal inclination in east and west azimuths. The casing A, A consists of a cover, the lower half fixed to a disc B; and contains the bearings of the needle together with stop mechanism. At the bottom of the case A is a hollow weighted rod carrying a rod of soft iron. In the disc B are sockets *H* receiving induction bars *H*, *H'* the action of which accelerates the alterations of inclination of the needle. A scale *k* is carried by the bar *H*, together with an eye-piece with a vertical slit; this eye-piece serves for observing inclinations and for sightings. The dioptric frame *g* with vertical strings is for sighting. Two magnets *R* serve as inclination regulators. The disc B is supported on a gimbal ring E, pivoted on a guide ring G which lies inside a ring P, in a ring Q; the rings G and P are rotatable and may be clamped by screws I. On the ring Q is a steering index *s*; *p* is a sighting-index. In the support K is a third indicator regulator *R'*. The external casing may be coupled to the supports between E and G. S is a window. To render it available for both hemispheres, the needle has a double knife-edge or a cylindrical axis, and two mirrors. In a modification, the inclination of the needle may be indicated by a side scale. The mirror and the scale *k* are dispensed with, and the eye-piece *o* is used only for sighting. A vertical rod may be fixed to the axis of the needle to accelerate alterations of inclination. The eye-piece *o* may be dispensed with and the magnets *R* fixed to the casing.



supported on the ring G: or between the disc B and the ring E is a ring which carries the axes D. On this ring are bands of india-rubber fixed to the disc B. Pawls are used to put these bands out of action, fixing the ring and disc B together.

*Dromoscope, for indicating mean of two compass readings.*—Two discs  $\alpha$  and  $\beta$ , Fig. 4, are movable about the axis  $r$ . Two pointers B and S of equal length are clamped one by a screw I and the other to one of two jointed arms *g* by a screw H. A string *f* passes through a hole in *g* as shown, and the two arms are set at the two readings and the string gives the mean.

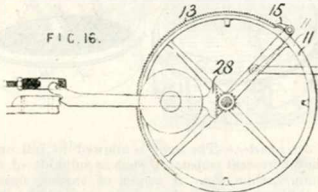
Abridged also in Class Registering &c.

**5175. Reddie, A. W. L.,** [*Siccardi, J. B.*], Dec. 17.

[*Provisional protection only.*]

*Insulating mariners' compasses.*—A box made of non-conducting material has a well at the top into which the compass fits. The box is filled with sea sand, so that there is a thickness of at least eight inches of sand at the sides and below the compass.

**5274. King, H. J. H.** Dec. 24.



*Registering-mechanism for barometers, pyrometers, anemometers, dynamometers, manometers, water-level registers, &c.* The mechanism consists essentially of uniformly-moving ratchet levers driving a wheel or wheels actuating the registering-mechanism, such ratchets engaging with sectors (adjusted by the pyrometer, manometer, &c.) by which they are disengaged during a portion or the whole of their stroke, so that the position of the sector will determine the amount of movement communicated to the wheel. In Fig. 16 the ratchet 15 and its lever are constantly vibrated by clockwork &c., and tend to drive the ratchet-wheel 13. A sector 11 disengages the ratchet during a portion of its stroke, and is loosely fitted on the shaft and provided with a pinion gearing into a toothed quadrant 28, in this case connected to a pyrometer, so that variations in temperature will cause the sector to take up a new position. The revolutions of the ratchet-wheel are communicated to an indicator, and show the average or aggregate amount.

Abridged also in Classes Air and gas engines; Brewing &c.; Drying; Furnaces &c.; Governors &c.; Heating; Hydraulic engineering; Hydraulic machinery &c.; Lifting &c.; Mechanism &c.; Registering &c.; Rotary engines &c.; Steam engines.

A.D. 1880.

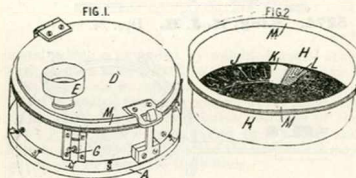
118. Pursall, W. Jan. 10.

*Microscopes in thimbles.*  
Two washers *c, e* are pierced, a photograph or other ornament being placed on the inner one *c* and a magnifying-lens *d* placed between them; this combination is fixed in the top of the thimble, which is also pierced.

Abridged also in *Classes Advertising &c.; Sewing &c.*



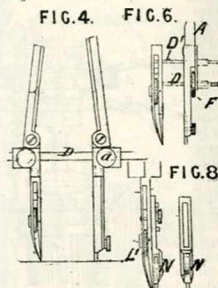
185. Warnerke, L. Jan. 15.



*Actinometer.*—The light is allowed to fall on a phosphorescent substance such as sulphide of calcium, barium, &c. A screen of varying opacity is then rotated over the substance until the light due to phosphorescence is completely cut off. The phosphorescent material is contained between two glasses in a disc *A*; over this is a revolving box with a hinged top and a circular hole in the bottom opposite the telescope *E*. A small portion of the phosphorescent material can then be exposed to the light on opening the lid *D*, an indicator *G* on the disc *A* showing which portion has been exposed. After exposure, a tube *H*, with a projecting rim *M*, is placed in the box. This tube has a double glass bottom, and between the glasses is placed a series of semi-transparent discs of increasing opacity 1, 2, 3, &c.; *K* is a clear space and *L* a green glass for destroying the phosphorescence. The tube *H* is turned round in the box until the light cannot be distinguished on looking through the telescope. The intensity of the light is shown by a calculating-arrangement of moving discs on the back of the instrument. For the next observation a new surface of the phosphorescent material is used by turning round the box. If all the material still retains some luminosity this can be cut out by the green glass *L*.

Abridged also in *Class Photography.*

357. Newton, A. V., [Wallegg, F., and Hirsch, A.]. Jan. 27.



*Compasses.*—Relates to means for maintaining parallelism between the lower parts of the legs or between the legs themselves in bow pens or pencils. A rod *D*, Fig. 4, smooth or screwed, slides in holes below the joints in the legs. With a smooth rod both ends may be clamped; with a screwed rod one end is clamped and the other works in a micrometer nut held in position by a spring-frame. For small circles the compass shown in Fig. 6 is used. The rod *D'* slides in the leg *A*, and the screw-rod *D* is moved by a nut *F*.

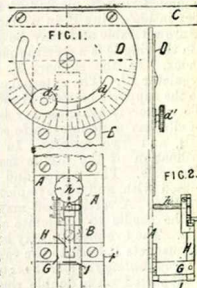
*Drawing-pens.*—For adjustment, a micrometer nut *L*, Fig. 8, between the blades works on a screw fixed to one blade. A pawl holds the nut in position. For ruling dotted lines a guiding stud *N* is fixed to the back of the pen to work on a ruler with an undulating edge.

358. Newton, A. V., [Wallegg, F., and Hirsch, A.]. Jan. 27.

*Parallel ruler;*

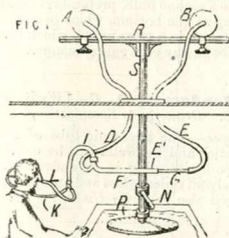
*protractor &c.*—The

stock *A* of the instrument is fixed directly to the blade *C*, or by means of a protractor, as shown. The stock is slotted as seen in the drawing, its two parts being connected in front by a plate *E* of vulcanite &c. and at rear by the bridge *F*. Between the two parts of the stock is a slide *B*, fitted, adjacent to *F*, with a pair of supports *G* carrying a bell-crank



lever H, the horizontal arm of which bears a micrometer screw *h*; the other arm of H presses against the bridge F. In use the stock A is held on the paper and the micrometer screw *h* turned. The pressure produced forces the slide B on the paper, and the bell-crank lever H, acting on the bridge B, moves the stock with the blade; after ruling the line, the slide is brought back to its original position by the spring I. To draw equidistant radial lines, one end of the blade C is fitted with a socket which is fixed by a pin. The protractor D may be dispensed with and the blade C fixed directly to E either at right angles or inclined; it is secured by a clamping-screw. Blades with undulating edges may be used, or a blade giving a vertical motion to the pen so that a dotted line is drawn: in these cases the pen or pencil is fitted with an adjustable guide pin.

495. Clark, A. M., [*Mayer, A. M.*]. Feb. 4.



*Sounds, locating*, specially applicable to the navigation of a vessel in a fog. Two resonators A and B are adjustably mounted on a suitable stand, and connected by adjustable, preferably flexible tubes, with a pipe I, leading to ear tubes L, K. In using the instrument, the resonators are first tuned to the pitch of the sound to be observed, by moving their telescopic joints in or out &c., and are then adjusted equi-distantly from the shaft S, at a distance from each other slightly less than the wave length of the sound. The telescopic joint F, G, of the tube E, E', is then so adjusted that the tubes E, E', and D are of equal length, after which, if the shaft S be slowly rotated as soon as the two resonators A, B touch the same sound wave surface, the observer having the tubes L, K applied to his ears will notice a sudden increase in the intensity of the sound. At this time the pointer P, which moves over a divided circle if desired, connected with, or forming part of a mariner's compass, will point towards the source of the sound. To verify the result, the length of the tube E, E' may be diminished to an amount equal to half the wave length of the sound under observation, when, the shaft S being rotated, a diminution of the sound will be noticed directly the two resonators touch the same sound wave surface. In a portable form of the instrument, the shaft S is dispensed with, the cross shaft R fitting over the shoulders or other part of the observer, and a pointer being attached thereto, and extending forward in front of the observer's face.

Abridged also in Classes *Electricity &c., Div. III.; Signalling &c.*

603. Barham, G. Feb. 11. *Drawings to*

*Specification.*

*Lactometer.*—Consists in providing an hydrometer with a scale or scales, graduated so as to indicate the relative percentages of milk and water. The "milk-gauge" is marked 0 at the top and 100 at the bottom, and may go below 100. The water-gauge is marked in the reverse way: this may go below 0. One lactometer may have both scales, on opposite sides of the stem, or it may have only one. The stems may be flat or hollow metal stems or tubes with exterior scales, or of round, or other shaped, glass stems or tubes with interior scales, or of any other suitable shape or material.

Abridged also in Class *Milking &c.*

781. Thomson, Sir W. Feb. 23. *Disclaimer.*

FIG. 14.

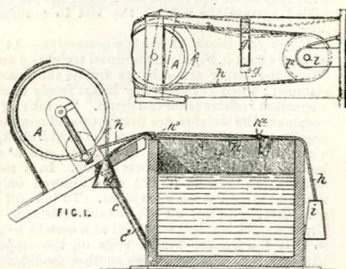
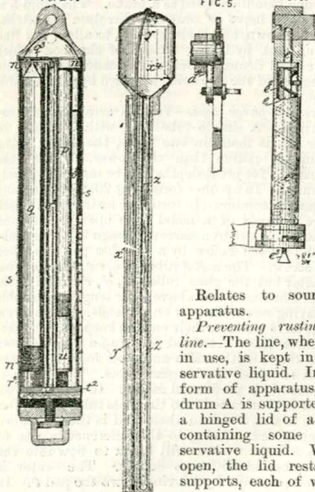


FIG. 20.

FIG. 25.

FIG. 5.

FIG. 6.



Relates to sounding apparatus.

*Preventing rusting of line.*—The line, when not in use, is kept in preservative liquid. In one form of apparatus, the drum A is supported on a hinged lid of a box containing some preservative liquid. When open, the lid rests on supports, each of which

consists of a rod  $c$  hinged to the lid, and sliding in a tube  $e$  hinged to the box. In a modification, Fig. 14, the box has two lids, one of which carries the drum and the other a pulley  $F$ , from which the drum is driven by a driving-band  $h$ , the spindle  $l$  being worked by manual, steam, or electric power. In a further modification, the framework rests on feet, which, when the whole apparatus is lifted out of the box, are slid on supports near the top of the box and fixed by screws or wedges.

*Winch handles for casting-apparatus* are described which may be put out of gear easily, when the line is running out. In one form, Fig. 5, the handle is put into gear by a sliding pin  $d^2$  which passes through the axle. In a modification, Fig. 6, a rod  $e$  is pressed by a spring into a hole in the axle. When this rod is pulled out of the hole and turned through a right angle, its T shaped head  $e^2$  prevents its return. The part of the handle grasped by the hand may be turned round the axis of the pin  $e$  and folded against the side of the box to economize space.

*Brake for winch of casting-apparatus.*—At the ends of a cord  $h$ , Fig. 1, are unequal weights  $g$  and  $i$ . When the larger one  $i$  hangs freely, the drum is clamped; when the smaller  $g$  hangs freely there is a constant resistance on the drum. To take off all resistance the weights are drawn up and connected together directly, so as to leave the cord  $h$  slack, by a cord  $h^2$ , which is drawn through an eye  $h^3$  and hooked to the eye  $h^2$  to form a loop. In a modification the smaller weight  $g$  is allowed only a limited movement between stops. To take off the resistance, or to put on a constant resistance, the larger weight is raised and fixed at a certain height, so that the smaller weight rests on the stops or hangs freely. Fig. 14 shows another modification, in which a driving-band for working the drum from a second spindle is used as a brake. The band  $h$  is allowed to move in only one direction by ratchet gear, as shown, and is slackened off, to allow the line to run out, by lifting the lid of the box which carries the drum, sufficient resistance to regulate the egress of the line being supplied by a detachable weight  $g$ .

*Pressure-gauge type.*—Various arrangements are described. A simple tube lined with chromate of silver &c. is made in two parts, the upper being of smaller calibre than the lower, so that the indications for great depths may be more accurately measured. In another form, Fig. 20, three or more gauges are combined to form one instrument. Each gauge consists of a metal tube open below and connected above by a narrow passage to a glass tube which is closed below by a movable pad  $F$  worked by a screw. The metal tubes  $p, q, r$  are of unequal diameter but the glass tubes,  $p^2, q^2, r^2$  are of equal bore. The metal tubes have their length adjustable by having screw pieces  $u$  on the ends. These screw pieces have cloth on their ends to keep out sand &c. All these tubes are fixed to a cap  $u$  which screws into a case  $s$  with scales and slots for reading the height of water in the glass tubes. This again is protected by a perforated casing. In use, when all the air is compressed into the glass tubes, the water begins to overflow into them and is there retained and measured. Owing to the difference in size of the metal tubes water will begin to flow into the glass tubes at different depths. The water is allowed to escape by moving down the pad  $F$ . In

another form, a flat elastic metal bottle  $x$ , Fig. 29, containing liquid, is connected by a tube  $y$  to a rigid bottle  $z^1$  with a glass tube  $z$  which measures the amount of liquid forced out of the elastic bottle.

Abridged also in Class *Lifting* &c.

### 796. Zambra, J. W. Feb. 23.

[Provisional protection only.]

*Self-registering thermometers.*—In these thermometers as usually made, when the temperature falls below that at which the bulbs were sealed, the air which was contained in the alcohol escapes and forms a globule in the bend of the tube. This is obviated by so constructing the thermometer that the pressure of the atmosphere may be exerted on the column of spirit, the sealing of the tube being, however, so effected that the evaporation of the alcohol is prevented. This is done by connecting the upper bulb of the thermometer by an inverted U tube to a second bulb, preferably elongated, with an opening at the bottom, which opening just dips below mercury in a glass vessel, which is secured to the U tube in any convenient manner.

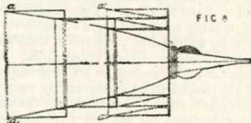
### 848. Henderson, A. C., [Wydtz, E. A. E.].

Feb. 26. Drawings to Specification.

*Telescopes.*—The telescopic tube of a combined walking stick and umbrella can be converted into a telescope by inserting in its ends tubes carrying respectively an object glass and an eyepiece.

Abridged also in Class *Umbrellas* &c.

### 1014. Wirth, J., [Retting, A.]. March 9.



*Sounds, conducting &c.*—The sound to be observed is conducted from a paraboloid to the ear by a tube fitted with a terminal of bone, india-rubber, &c., which is applied to the ear. If the tube is placed behind the paraboloid, the vertex of the latter is cut off, and a conical pipe piece, fixed to the tube, is inserted in the cut portion and arranged so that all sounds passing through the focus are reflected therein. If the focus falls in front of the vertex cut, a second small paraboloid is placed in front of the first to reflect the sounds into the conical pipe. If the conducting-tube is placed in front of the paraboloid the second paraboloid is not required. The apparatus may be supported by universal ball joints provided with a screw and a vertical pin, pivoted in a hollow standard, to allow of their turning in any direction. To lessen the pressure of the terminal on the ear, a short pipe may fit tightly to the tube, and rest in a ring, attached to a button, which may be fastened to a slit or button hole of the coat &c., and the intensity of the sound transmitted to the ear may be regulated by means of concentric rings



arranged before the front opening of the paraboloid, the whole of the rings being used together to produce the maximum reflecting surface, and one or more being detached to diminish it. The parabolic reflectors may be made telescopic as shown if desired to increase their portability.

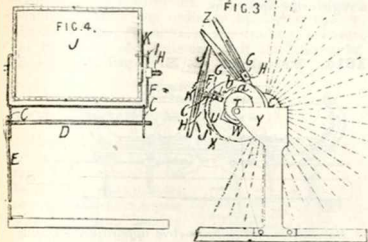
Abridged also in *Classes Medicine &c.; Railway signals &c.; Signalling &c.*

**1064. Offenbacher, S.** March 11.

[Provisional protection only.]

*Spectacles.*—The angle of the glasses is capable of being varied with respect to the sides or temples to suit the direction of vision for the time being. This may be effected by connecting the joint leaf by a screw pivot or otherwise to the temple so that the latter is capable of movement round axes at right angles to those of the joint pivots.

**1093. Rogers, J. M.** March 13.

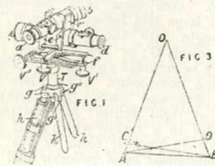


*Stereoscopes.*—The invention relates primarily to apparatus for displaying photographs, cards, pictures, &c. which are exhibited through windows in a suitable wooden &c. case or "cabinet album" with an inclined face, which serves as a guide for the travel of the frames in which they are held. The front of the case is preferably hinged and can be fitted with the usual stereoscopic lenses. The frames J, which are grooved for holding the pictures &c., are supported on pivots I, formed by the bent and flattened ends of wires F, which pass as shown through a block G to form a projection H; and also through perforations in two discs C, carried on a revolving shaft D held by a spring in bearings on a standard E. The other end of the shaft D is made square and fits into the boss of a toothed wheel by which it is operated, by means of another toothed wheel, and a pinion on the shaft of an escapement-wheel. On a standard Y is fixed an eccentric T, upon which slides a cam U having an aperture over which a yoke W is fixed. It has slots a into which pins b on a second cam X take. This cam X is fixed to the operating-shaft and a pinion thereon passes through the aperture in the cam U. The blocks G on the wires F rest on the cams, and both cams are provided with slots to

receive the projections H. When the apparatus is revolved by means of a nut or handle outside the case, the cam U, as well as turning, is raised by the pins b traversing the slots a, which brings one of the frames F into an inclined position as shown, the flattened pivot I distending the spring K and holding it firm. The escapement-wheel prevents more than one frame being raised at a time. As the cams continue to revolve the frames are released and turn over as shown and another is raised. In the Provisional Specification the apparatus is described as being worked by a lever operating a cord passing over a pulley and attached to a click which works upon a notched, slotted wheel, to which a double-arm lever is fixed for raising the frames.

Abridged also in *Class Advertising &c.*

**1095. Morgan, T., [Morici, A.]** March 13.



*Range-finders.*—To measure the distance of a point O, Fig. 3, from A, a base AB is taken and known angles x are set out at A and B; the lengths BD and AC are then determined; from these data the distance AO is found by tables &c. The angles x may be set out by the aid of two telescopes and the lengths BD and AC read on a scale. Two telescopes a b and c d, Fig. 1, are fixed at a known angle in the spring jaws e, e'. Arms f, f' are attached to the stand of the instrument and are connected in pairs by hinges; springs tend to open the hinges. Three pairs of these arms are employed, one pair, by means of the screw V, causes a displacement parallel to the telescope a b, another pair by a screw V' a displacement parallel to the telescope c d, and the third pair by a screw V'' a displacement parallel to the horizontal plane. A socket T is fixed to the bolts g, g', g'', to which are hinged the legs; or for military purposes the plugs h fit into the muzzles of rifles. This instrument is placed at one end of the base line AB and one telescope is pointed towards the object of which the distance is required. At the other end of the base line is the middle of a horizontal bar which forms the zero of two scales thereon. This bar is fixed on a stand similar to the stand above described. The two instruments are then changed and another reading is taken. Both the scale and the telescopes may be on the same stand, and with two such instruments no changing is required. The scales on the bar may be provided with a sliding vane and a vernier. The bar may be placed on the ground and "its position determined by means of a plumb line and a vertical pinule annexed to the two lines of sight."

Abridged also in *Class Photography.*