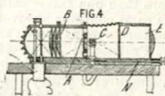
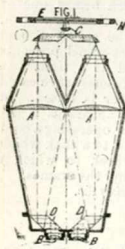


1217. **Lake, W. R.**, [Molera, E. J., and
Cebrian, J. C.]. March 20.



Microscopes.—Relates to instruments for viewing microscopic photographs, such as those described in Specification No. 1216,

A.D. 1880. One form is a binocular microscope with large field lenses A, Fig. 1, the image being brought into the two eyepieces B by reflecting prisms D; or the rays from the object glass C may be reflected upwards into the inclined tube of the instrument. The plate holder E admits of fine and coarse adjustments in two directions at right angles; for this purpose the holder slides in a frame, which itself slides in a frame M. In another form of the apparatus light is condensed by a reflector and lenses B, Fig. 4, on the object A; an image is then formed by the microscope lenses C on a transparent screen D, which is further magnified by a lens E. The light may be electric light, the apparatus being worked by the foot of the observer; or a heliostat may be used. The lenses C are adjusted by a screw N, and the two sliding adjustments of the holder A are effected by water pressure, the two slides being connected to pistons in cylinders, which communicate by pipes to cylinders in the front of the apparatus. By means of plungers screwing into these cylinders the movement of the sliding is effected; for the fine adjustment smaller plungers screw inside the larger tubular ones.

Abridged also in Class Toys &c.

1355. **Spong, J. O.** April 2.

[Provisional protection only.]

Kaleidoscopic apparatus for advertising, amusement, &c. A weighted foot or table serves as a bearing for a vertical rod, and for a frame carrying an eye &c. to a bearing for the other end of the rod. A disc or tray, adjustably supported on the rod, carries the pieces of coloured gelatine &c.; at the top of the rod a fan-wheel is fixed, and rotated by means of a current of air from a gas or other flame. Two other pedestals support frames carrying mirrors so that the objects are reflected in succession as the tray is moved by the fan-wheel. To rearrange the objects for multiple effects they are disturbed by lengths of india-rubber, chains, rods, &c. suspended over the tray. A small length of chain, or adjustable vanes, may be attached to the fan to act as a check or brake, by coming against certain parts of the framework; or a drag may be

otherwise obtained. The tray may be carried on an inclined axis, and rotated by a pin and pin-wheel.

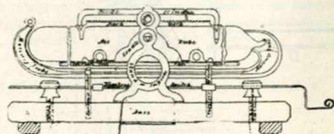
Abridged also in Class Advertising &c.; Toys &c.

1581. **Sombart, C. M.** [Wiske, F.].
April 17.

[Provisional protection only.]

Thermometers; barometers.—The variation of pressure, due to change in temperature, of a constant quantity of enclosed gas is indicated by means of disc-shaped springs which separate the rarefied gas from a vacuum; these springs are of corrugated metal and are connected in the centre by a stem, which moves a pointer over a dial. The springs may be replaced by tubes, one being vacuum and the other connected with a closed vessel containing rarefied gas. For open air and rooms the air vessel and connecting tube may be dispensed with, the apparatus being placed in a hermetically-closed case with a glass cover. This instrument may be connected with an aneroid barometer, "an elastic plate being connected with the hand of the barometer." The transmitting-lever may actuate a registering-apparatus.

1614. **Pritchett, G. E.** April 20.



Barometric and thermometric apparatus.—A tube containing mercury or spirit is so supported that variations in temperature or pressure cause the instrument to vibrate upon its support. These changes of equilibrium are indicated on a scale or electrically by an alarm, or may be registered automatically on a moving drum covered with sensitized paper. The Fig. shows a thermometric apparatus which may be used as a fire alarm. It consists of a tube supported horizontally, to which a smaller tube containing mercury is attached. Variations in temperature will throw the instrument out of equilibrium and in so doing close the electrical circuit connected with an alarm bell.

Abridged also in Classes Electricity &c., Div. III.; Fire, Extinction &c. of; Heating.

1665. **Johnson, H.** April 22.

[Provisional protection only.]

Protractors forming stencil plates.—The frame is double, one part being inside the other. Between the two parts is a thin bridge with perforations corresponding to divisions. Or the frame may be one piece with the metal thin where the perforations are. The protractor is marked on plans &c. by stencilling. An old protractor may be removed

by bleaching &c. and a new one marked in accordance with any change in the magnetic meridian.

Abridged also in Class *Printing other than letter-press &c.*

1733. Fox, H. B. April 28. *Drawings to Specification.*

Lenses.—A water (or other liquid) lens for irradiating light from any source consists of two glasses surrounding the light, one nearly cylindrical but preferably curved in vertical section and the other formed with curved lobes. Sometimes both are lobed, and in other cases one is curved and the other flat or angular.

Abridged also in Class *Lamps &c.*

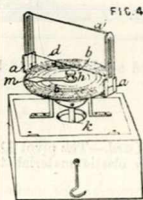
1866. White, H. V. May 7.

[*Provisional protection only.*]

Measuring distances.—Relates to arrangements, applicable to theodolites and dumpy levels, for measuring the distance of the staff used in levelling from the instrument itself, thus dispensing with chaining. Two wires are fixed parallel to, and equidistant from the ordinary horizontal wire in the diaphragm. Then from the reading, between the two wires, of a scale or a staff, the distance of the staff is calculated.

1934. Thatcher, H. J. May 11.

Magnetic compasses, correcting.—Relates to apparatus for comparing the bearing of the sun or stars, according to the compass, with their true bearing. A graduated disc *b* is loosely mounted on a spindle *k* which is supported on gimbals and weighted at its lower end so that it hangs vertically. The spindle carries a pointer *m*. Below the disc is loosely mounted the frame *a*, carrying wires *a'* and *d* and formed with sight vanes. In using the instrument, *m* is pointed in the direction the ship is going, and *b* is turned until *m* gives the same indication on it as the compass to be corrected. The frame *a* is then turned until the shadow of *d* falls over the centre of the card: the bearing of the sun according to the compass is thus found, which is compared with the true bearing. The sight vanes and the upper wire *a'* are for taking bearings of stars or other objects.



apart, and in the small rectangular space formed by their intersection the marking-point fits. Separate radius bars, with centres in the base, have studs which fit in the spaces between the cross-bars of each frame. These two rods are made to move with the same speed by means of two toothed wheels of the same size; in gear with both wheels is another wheel worked by a pinion. The radius bars are grooved and contain slides which carry the above-mentioned studs. A scale may be set along the edge of the groove. One radius bar is mounted directly on its toothed wheel, while the other is mounted on a graduated disc, that can be adjusted relatively to an index on another disc carried by the axis of its toothed wheel. In order to draw definite portions of ellipses at definite distances apart, each of the toothed wheels carrying the radius bars has pointers moving over graduated circles. The marking-point consists preferably of a hollow rectangular bar, which fits accurately in the space above mentioned; through this bar slides a bar carrying the marking-point. The upper end of the bar has a collar which rests on the cross-bar, and which has projections on its upper face; the rod carrying the marking point has also a collar which when lifted will rest on projections on the bar collar, and keep the marking-point from the paper. For adjusting the direction over the surface to be drawn on, a rectangular frame which rests on the said surface has a groove along one of its sides in which slides a bar of a second frame: the movement takes place by means of a rack and pinion. This sliding frame has a groove at right angles to the main frame, in which groove slides a bar to which the instrument is attached, this motion also taking place by means of a rack and pinion. Micrometer screws may be used. To the base of the drawing-instrument is attached a straight edge, having a nick by which the instrument may be set to a copy.

1992. Hepple, J. May 14.

[*Provisional protection only.*]

Clinometer.—The instrument is primarily for setting out angles in measuring for garments, but is applicable for indicating the inclination of planes generally. The instrument consists of a rule or straight-edge *A*, having on its face a graduated semicircle; in the centre of the semicircle is a plummet *b*, or metallic pendulum loosely attached to a projecting pin.



Directions are given for use in measuring for garments.

Abridged also in Class *Wearing-apparel, Div. II.*

1989. Wirth, F., [Nolten, G.] May 14.

[*Provisional protection only.*]

Ellipsographs.—Two rectangular frames slide one upon the other in directions at right angles between fixed guides on a base. Each frame has two transverse parallel bars at a small distance

2032. Bell, J. May 19.

[*Provisional protection only.*]

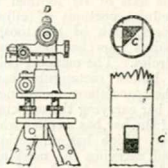
Finding the positions of places on maps &c.—A travelling pointer is marked with numbers or letters corresponding with others marked round the edges of the map &c., and is moved by a rack and pinion, or two pulleys and a catgut band &c. An

alphabetical index of all the places, streets, buildings &c. is provided giving the number &c. on the pointer which would pass thereover in its travel and also the angle at which the pointer would stand. A scale of miles and cab fares is arranged on the map, and a movable scale may be provided which is adjustable to any desired position, to ascertain the distance between any two places.

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

2142. Stanley, W. F. May 26.

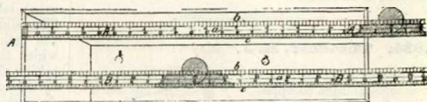
Measuring distances.—Two telescopes, one at each end of a base (consisting of a steel band), may sight a distant staff; or a single telescope may sight two staves at the ends of a distant base. When only one telescope is used the measuring-band is fixed to staves and placed at right angles to the line of sight of the telescope. The telescope D



2233. Appleton, L. June 1.

Scales for bisecting the distance between two points. Two sets of graduations *b, c* are used, one marked in the usual manner with inches, feet, &c. and the other with $\frac{1}{2}$ inches, $\frac{1}{2}$ feet, &c. commencing at the centre, the figures running right and left. For indicating the centre the ordinary measurement is first taken and then the same figures in the other division are placed at the points to be measured, when the zero mark will indicate the centre.

Abridged also in *Class Registering &c.*



2243. Humphrey, J. T. June 1.

[Provisional protection only.]

Combined rule, protractor, mitre gauge, set, and T-square.—The rule is made of two or more parts joined together so that two parts can turn on a screw pin joint, the screw pin having a milled nut attached thereto. Concentric with the pin one part is marked out with degrees &c., to which the other part can be set and secured by the nut, at any desired angle. For a T-square one part is formed with a slot and the other with a hole; the parts are laid crosswise and the pin inserted in the slot and hole, the parts being kept in position by the screw nut.

Abridged also in *Class Registering &c.*

2392. McGregor, D. June 12.

Compasses, magnetic.—Relates to means for neutralizing the vibration of the ship, and for correcting the errors due to local attraction; also to lighting the binnacle.

Bowls.—A and B are bowls with weighted bottoms which may be transparent for illumination from below.

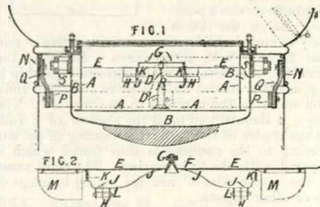
is mounted on a vertical axis, the cross hair reading against an arc below. The telescope first sights one staff and is then clamped; the arc or its vernier is then turned by a tangent screw until the other staff is sighted; knowing this angle the distance is found. In the case when two telescopes are used one telescope only need be similar to the one above mentioned; they both have arms to which the line is attached, the tension of the line keeping the telescopes with their lines of sight at right angles to the line. A distant staff is sighted by one telescope and then the one with the arc is turned until the staff is sighted; from the angle turned through the distance is found.

Staves.—These have hooks to which handles of the line are fixed. Set in one of the staves is a right-angled prism C as a sight director for setting the line at right angles to the line of sight of one of the telescopes.

Measuring-line.—For a base when finding distances by triangulation with telescopes a steel band is used, with handles on the ends. It is divided into equal parts by rings &c. through which the band passes. The band may be jointed to separate into parts at places. The line may also be used for measuring.

Abridged also in *Class Registering &c.*

Card.—The pivot D is fitted in a tube D' with any elastic material to compensate for vertical



vibration of the ship. The cap F is on a bridge G or in a collar and may be on the card or be fixed to D' when the pivot D is on the card. The card E is of mica or cloth with red letters in the northern half and blue in the southern. M, M are vanes of mica to diminish the sensitiveness.

Magnets.—These (H) are thin steel bars; they are fitted to the underside of the card by springs J, the

ends of which are fixed to the card by spiral springs K. The bars are separated by light nonconducting material.

Binnacle supports.—The ring P is supported by strips of elastic material Q; the gimbals ring S is supported in lugs R on P.

Magnets for correcting errors.—Inside the binnacle stand are two or more vertical strips with holes; to these strips compensating magnets are fitted, attached by thumbscrews &c. For correcting the heeling error a central magnet on a vertical strip is used. Quadrantal error is corrected by blocks of soft iron &c. in boxes at the side of N, Fig. 1.

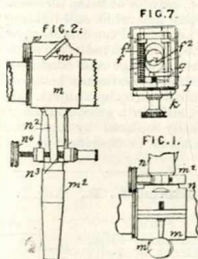
Heeling of ship may be shown by a pointer attached to the compass &c. and a graduated circle.

Lighting.—The lamp may be fitted above to throw light by reflection on to the card; or there may be side lights, or one underneath.

Bearings, determining.—The Provisional Specification states that the compass bezel may have an arrangement for taking observations of celestial objects, or for cross bearings &c., a reflector with sight vanes being used.

Abridged also in *Class Ships &c., Dic. I.*

2399. Hensoldt, H. June 12.



Relates to range-finders in which the apparent size of a known object is observed.

Scales.—In the eyepiece of a telescope is fitted a glass disc, with a scale engraved on it. When the image is greater than half the scale the bottom line of the scale is used as the base line; when less the middle line and the image are brought in the lower part of the field of view. For different sized objects glasses with different scales are provided. In a modification, Fig. 7, a small plate of metal having teeth on its inner edge at equal distances apart is placed in the eyepiece. A cobweb f stretches across the centre of the field and another f^1 is fixed parallel to the first and at a known distance from it. Instead of the teeth and the filaments f^1, f there may be a plate of glass with these engraved on. Another cobweb f^2 is fixed to a sliding frame g , which is moved by a screw j provided with a disc or vernier k .

Vertical adjustment of the telescope.—A pivot is fixed to a ring m which is clamped by a screw m^1 to the middle of the telescope. This pivot revolves in a T-piece m^2 , which fits into a socket

in the stand. On the pivot is clamped a ring n by a screw n^1 ; when the ring is loose a rough adjustment may be made; for a fine adjustment the arm n^2 which is fixed to the ring n is moved by the screw n^1 .

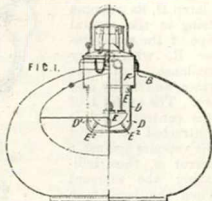
Eyepiece adjustment.—A rack and pinion may be used, or a ring may be clamped by a screw to the eye piece, being unclamped for the rough adjustment; the fine adjustment is effected by a screw, working through the ring and through a lug on the second section of the telescope.

2432. Sim, J. M. June 16.

Binnacles.—The

compass card is lighted by a lamp, similar to those used for lighting railway carriages, inserted in the top of the binnacle dome; the dome is painted dead white inside to serve as a reflector and is furnished with a raised flange B over which the lamp head fits, so keeping out water.

Abridged also in *Class Lamps &c.*



2434. Simpson, W., Simpson, W. T. W., and Wilkinson, J. June 16.

Mathematical instruments, pivot joint for.—A screw A is passed

through one part and screwed into the other part of the joint and then secured by a lock plate or nut B. The parts are recessed as shown to receive the screw head and lock nut.

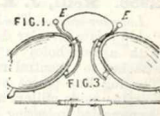
Abridged also in *Classes Cutlery; Hinges &c.; Medicine &c.*



2586. Michaels, J. P. June 25.

Eyeglasses and spectacles.

—Relates to means for increasing the stability of eyeglasses and spectacles; also to keeping them at a fixed distance from the eyes. On the frame or spring of the glasses are two little branches E, with knobs, which project from the plane of the glasses, when the latter are open. These branches rest one on each side of the nose, and fit under the eyebrow arch. When the glasses are folded up the branches are folded in.



2729. Perrier, L. July 3.

Alcoholmeter.—A manometer is used consisting of a glass tube M with a tapering point P, projecting into a reservoir, soldered thereto at K, and nearly filled with mercury, the upper part being occupied by a volatile liquid. The manometer dips into a small boiler A. The liquid L to be analysed is boiled by a lamp D, its vapours rising in the central pipe of the refrigerator R, where they condense, heat the water, and finally pass out. The outlet I of this central pipe is contracted to direct the vapours against a mirror m, thus indicating the moment when the tension in the boiler equals the barometric pressure. A liquid placed in the boiler, containing say 10% of alcohol, produces a vapour, which communicating its temperature to the contents of the gauge, raises the quick-silver to a certain height, indicating the strength on a scale.

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

2737. Hammond, D. July 3.

[*Provisional protection only.*]

Ruling parallel lines.—On a board are placed two parallel strips, at a fixed or adjustable distance. In these strips are parallel notches inclined to the board, and at regular distances apart. A ruler or T-square placed in these notches is used to rule lines on paper, slates, &c.

2958. Neill, J. R. July 17.

Logs for ships.—The log "chip" is a circular disc, with a few holes in it, attached to a central rod. The log line passes over suitable guide pulleys and is connected to spring indicating apparatus of which one form is shown in Fig. 2. The pull of the line, which is attached to the bar E, is resisted by springs H, the movement being communicated by the rack I and pinion J to an adjustable pointer on the axis

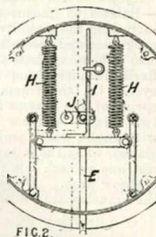


FIG. 2.

of the pinion. The pointer moves over a dial graduated by calculation. The pointer may be fixed and the dial movable. The spring H may be arranged for compression; or a single spring may surround E and a straight scale used. To prevent a jerking motion in heavy seas the guide pulley below the indicator may be held by suitable friction, as discs of indiarubber on the sides, the pressure being regulated by a plate and screw.

2976. Walton, F. July 19. *Drawings to Specification.*

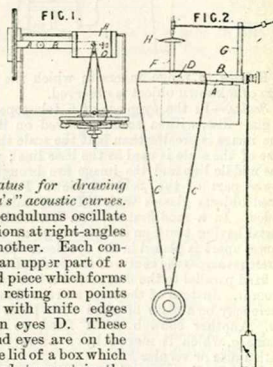
Opera-glass tubes.—Consists in forming these and other hollow articles by moulding a composition of oxidized or solidified oil &c. upon a form of paper, paper pulp, fabric, or sheet metal.

Abridged also in Classes *Boxes &c.*; *Furniture &c.*; *Hollow-ware*; *India-rubber &c.*; *Moulding &c.*; *Preparing &c. cork &c.*; *Table articles &c.*; *Trunks &c.*; *Watches &c.*; *Wearing-apparel, Dic. I.*

3123. Swift, J. July 29.

[*Provisional protection only.*]

Microscopes.—Relates to improvements on Grubb's radial traversing substage, which carries a condenser &c., capable of being turned at any angle with the optical axis while still lighting the object on the stage above, and consists in pivoting on the said radial piece a second radial arm piece which also carries another substage and condenser &c. This radial traversing apparatus can be moved above the stage to illuminate an opaque object. Also the whole substage may slide in a groove in the stage, so that it may be easily replaced by any other substage. Reference is made to Specification No. 1477, A.D. 1854.

3168. Molison, A. R. Aug. 2.

Apparatus for drawing "Lissajou's" acoustic curves.—Two pendulums oscillate in directions at right-angles to one another. Each consists of an upper part of a T-shaped piece which forms a rocker resting on points B, and with knife edges resting in eyes D. These points and eyes are on the reversible lid of a box which is arranged to contain the apparatus. The cross-bar of each T-piece carries cords C, C, on which the pendulum bobs are suspended. To one piece is

fixed an upright F carrying a table H with a cylindrical surface, to which a sheet of paper is fixed. On the other T-piece is an upright G carrying a pivoted frame which holds the pen. The lengths of the pendulums may be varied by having on the T-pieces a reel by which the cords C may be wound up or let down. The pressure of the pen on the paper can be adjusted by a small weight.

3213. Bamber, E. F. Aug. 5.

Thermometers for high temperatures.—Suitable fusible metals, or alloys, which are solid at ordinary temperatures, are employed in a tube or vessel so that their expansion when in a fused state may be measured. Combustion tube glass may be used for the tube if the temperature be low enough. The bulb is filled either by pouring the molten metal through a hole in the bulb which is afterwards closed; or, a short tube of wide diameter with a bulb is filled and then a narrow tube fused into it; or small pieces of the metal may be dropped in and afterwards fused; or the bulb may be filled in the same way as a mercurial thermometer. The bulb may be of plumbago &c. with a glass tube. Metals of different degrees of fusibility may be employed to make a series of thermometers, that with the most fusible metal being graduated by comparison with a mercury thermometer in a bath of molten metal, and each one in the series being used as the standard for graduating the one next above in fusibility. When glass cannot be used a plumbago &c. reservoir is used with a float attached to a rod moving over a scale of the same material. The motion of the rod may be magnified. Instead of a float a graduated strip of mica may be let in a slit in the reservoir. The stem must be kept at a temperature above the melting-point of the enclosed metal: a lamp may be used to effect this. The tube may be surrounded with the same metal, in a molten condition, that it contains. Before use the temperature is gradually raised in a bath of the same metal, the heating beginning at the top. After use the thermometer is cooled gradually. To prevent oxidation in an open tube a film of charcoal &c. covers the metal. Tin, lead, bismuth, and their alloys, aluminium, and copper are mentioned as suitable substances.

3464. Coglievina, D.

Aug. 26.

Photometers.—In a box A¹ is a source of light L¹, which sends rays through the lens F, and is reflected by right-angled prisms II to VIII to a ball F placed in front of a mirror S² so that it can be seen from outside the photometer box. The source of light is turned down until the beam is just strong enough to show up the ball F; this strength of light is adopted as a unit. This standard flame is then placed

3358. Garforth, W. E. Aug. 19.

[Provisional protection only.]

Plumb-bob for dialling, surveying, &c.—Relates to an adjustable plumb-bob for marking the position of the centre of the dial on the roof of an underground passage. A bracket is fitted with a slide, adjustable both longitudinally and transversely by racks or screws. The projecting portion of this slide carries a double axial bearing (like gimbal rings), to which is attached a tube fixed to a cord with a bob. Sliding on the tube is a split tube with a chalk mark. It is stated that a modification may be used for setting out angles by the dial or the theodolite, and other surveying purposes, and that the instrument may also be used for building purposes.

3389. Hansen, A. P. Aug. 20.

[Provisional protection only.]

Ruling-pens.—A metal tube containing the ink has its lower end flattened, and the corners ground off to form a V-shaped opening, the size of which regulates the breadth of the lines ruled. A vent cap is fitted at the upper end and when slightly raised admits air to the tube, but when pressed down closes it hermetically. A wick of asbestos inserted in the tube regulates the flow of ink. Combined ruling-pens and writing-pens and painting-brushes may be arranged by providing the different points for the same tubes. Abridged also in Classes *Brushing &c.*; *Writing-instruments &c.*

3462. Poseck, T., and Selten, J.

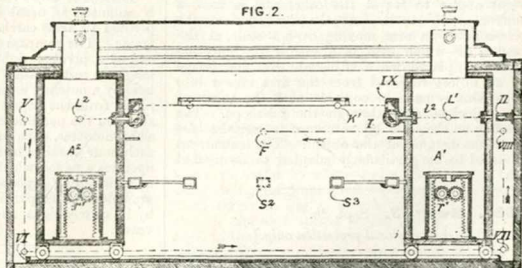
Aug. 26.

[Provisional protection only.]

Level.—Within a mortise in a wooden frame, is suspended, on a main axle, an indicator kept in a vertical position by a weight and moving over a graduated scale on the frame. On the main axle is a toothed wheel working into a pinion on an axle (at the side of the main axle) carrying a second indicator, also working over a dial and giving a multiplied reading of that exhibited by the main indicator.

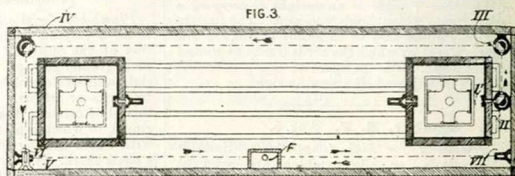
Abridged also in Class *Weighing-apparatus.*

FIG. 2.

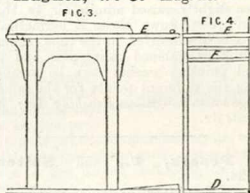


opposite a lens F , and by reflection from the prisms I and IX the light falls on a ball placed at K, which is seen by means of a mirror S^2 . A second source of light L^2 is placed in the box A^2 , which is moved to the right until the ball F is equidistant from the two boxes. If now the ball be equally illuminated on both sides, this second light will have an illuminating power of one degree. If it be greater than one degree the box A^2 is moved to the left until the ball is equally illuminated, when the degree of illumination will be indicated on a scale outside the photometer case. To avoid having a very long case, the box A^2 is moved until it indicates ten degrees, and then the light in it turned down until the ball is equally illuminated. This second light is then used as a unit and the first light turned up and adjusted until it indicates 100° . By proceeding in this way the intensity of the light can be determined. The boxes A^1, A^2 are on rollers and are moved by a rack and pinion &c., the height of the light being adjusted by racks and pinions r . The ball F is of phosphorus, quinine solution, fluorspar, &c. to make the light visible. When used for measuring the intensity of sunlight for photographers' use, the light is admitted at an adjustable slit.

Abridged also in Class *Photography*.



3499. Hughes, W. C. Aug. 28.



Dissolving-view apparatus.—Comprises a stand for two lanterns arranged, one above the other, on the shelves E and D respectively. The stand is formed with channels F to allow currents of air to pass between the lamps.

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

3549. Wheeler, W. H. Sept. 1.

[Provisional protection only.]

Telemeter or range-finder.—At one end of a constant base is fixed a telescope or plain sight at right angles to it; at the other end is fixed a mirror at 45° to it. At the same end as the telescope is an arm moving over a scale, at the centre of which arm is a mirror or reflecting prism so placed when adjusted that the image of an object reflected from the first mirror into the second is made to coincide with the image of the object as seen through the telescope. The reading on the scale on reference to special tables gives the distance of the object. The instrument is stated to be particularly adapted to be used at sea.

3867. Swift, J. Sept. 25.

[Provisional protection only.]

Microscopes.—Relates to a substage diaphragm for regulating the amount of light reflected from

the mirror. The diaphragm consists of a curved piece having variously-sized holes pierced in it, which are brought in turn opposite the aperture in the stage. It is connected to an arm or lever which moves about a horizontal axis at its lower end. The diaphragm is held at the proper positions by a spring catch. The curved piece may move in slots on the underside of the stage, being moved by a rack and pinion.

3939. Liveing, E. H. T. Sept. 29.

Thermometers, colouring alcohol for. In the alcohol used there is dissolved fluorescein with a little alkali, so that it reflects a green light but transmits a yellow. The thermometer tube is placed on a black background, either on the tube itself or on a scale. For a registering-thermometer the indices must be made of some reflecting-material, as enamel glass.

4042. Steenberg, A., [*Sachmann, F. A. H., and Dons, C.*]. Oct. 5.

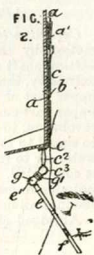
[Provisional protection only.]

Compasses, ship's recording.—The compass bowl is mounted as usual but the first gimbal ring is pivoted to arms carried by a balanced pendulous frame. The compass card rests on a pivot, on one end of a pivoted right-angled bar, of which the long end rests against the pendulous frame and is held by a notched lever so that the pencils can be raised from the paper when required. There is a shaft on the pendulous frame which is rotated by a chronometer, once an hour. A stud upon it once each hour pushes a lever on the right-angled bar and operates a pencil which makes a transverse mark on a travelling paper strip. In the compass card are holders for a pencil which presses on the paper by its own weight and marks the course of the vessel.

4148. **Betjemann, J.** Oct. 12.

Spectacles, supporting from the hat.—The leather lining *b* of the hat is clasped by a spring *a*, to which is hinged a thin leaf *c*. The spectacles *f* are fixed to an arm *e* having at its end a ball *e'* which works in sockets in two plates *g* held together by a screw *g'*. A second ball-and-socket joint *e''* connects the plates *g* with the leaf piece *c* through a rod *c''*. When not in use the spectacles may be turned up inside the hat about the hinge between the spring *a* and the leaf *c*; in this position it is held by a spring *a'*. Ordinary spectacles may be mounted in this way, in which case a spring clip on the arm *e* grasps the bridge between the glasses.

Abridged also in Class *Wearing-apparel, Div. I.*

4157. **Boye, L.** Oct. 13.

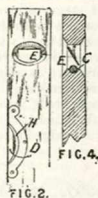
[*Provisional protection only.*]

Steam, indicating density, pressure, and temperature of.—A vertical cylinder fitted with a piston is connected to the engine or boiler. The cylinder is in communication with two other cylinders in one of which is a pressure gauge and in the other a thermometer. When all the cylinders are filled with saturated steam the connection with the boiler (or engine) is cut off, and the steam allowed to expand to a superheated condition. The proportion between a certain volume of the cylinder and the whole volume of the saturated steam being known at the beginning, the percentage of water contained in the steam can be ascertained, by measuring the travel of the piston.

Abridged also in Class *Registering &c.*

4345. **Vaughn, W. W., and Clark, A.** Oct. 25.

Spirit levels.—Consists in the combination of adjustable reflectors with the bubble tubes of the level and plumb, and also in enveloping or coating the tubes with a reflecting or dead white surface. *B* is the central tube containing liquid and a bubble. *C* is a similar transverse tube for using the instrument as a plumb. Above the centres of these tubes are hinged reflectors, as at *E*. A helical spring round the axis of the reflector serves to hold it in any position. To render the image more distinct a reflecting-surface *H* surrounds the tube. For applying the instrument to parts out of reach a rod is screwed into the end or lower side of the instrument, which rod may be kept when not in use in a hole in *A*.

4408. **Nawrocki, G. W. von,** *W. S. Dr.* Oct. 28.

[*Provisional protection only.*]

Photometers.—The invention depends upon the principle that the electric conductivity of selenium increases in proportion to the light cast upon it. The apparatus used to measure the amount of light consists of a selenium plate included in an electric circuit in which is a current from a constant source of electricity and a galvanometer.

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

4564. **Edmonds, E.,** [*Koch, O., and Eichhorn, A.*] Nov. 6.

[*Provisional protection only.*]

Thermometers.—Relates to the reading of thermometers at a distance by electrical means. Along the stem of the thermometer are fused several platinum wires which are connected to a contact board, in connection with a battery and bell. The mercury in the bulb of the thermometer is connected to the battery. As the mercury in the stem will make contact at certain points its position can be determined by pressing the keys of the contact board and observing whether the bell rings or not.

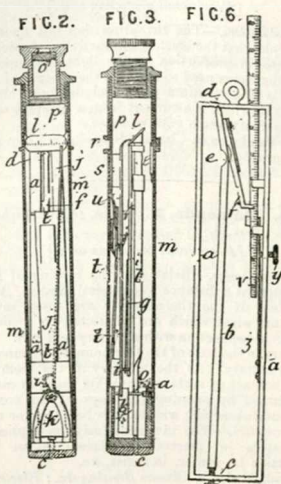
Barometers.—The invention may be applied to barometers in inaccessible places, as on high mountains in winter, in mines, &c.

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

4695. **Lake, H. H.,** [*Mathieu, R. & H., et fils, and Tremeschini, J. A.*] Nov. 13.

Thermometers —Relates to bimetallic thermometers, chiefly for clinical and like purposes, in which a pointer moves over a scale and may be arrested when the instrument is moved from the body &c. Figs. 2 and 3 show one arrangement. A rod *b*, Fig. 3, of steel &c., fits in a slot in a frame *a* of brass &c. and is held by a screw *c* and in a notch *d* in the frame. At the point *e* the rod *b* is thin and elastic, so that it can yield to the excess of expansion of brass over that of steel. To the steel rod *b* is fixed a rigid rod *f* and a flexible rod *g*, the rod *f* acting outside a bent rod *i* and the flexible rod *g* acting within. Attached to the rod *i* is a counterweight *k* with pivot *o*, and a pointer *j* with scale *l*. The above-described parts are enclosed in a case *m*. A cap *p* sliding in the case has a lens *h* for reading the scale, which is lighted by a hole *r* in the case; *s* is a window in the cap. When a reading is to be taken the cap is pushed in, and when it is thought that the instrument is of the same temperature as the body &c. the cap is pulled out. The window is thus brought opposite the hole *r*, and the pointer *j* is held by a spring *t*, which is pressed on it by a bent rod *u* on the cap. For ascertaining maximum temperatures the arrangement shown in Fig. 6 may be used. A rod *b*, of iron &c. forms a spring at the part *e*. An arm *f* fixed to the iron rod bears on a tapering graduated rod *v*. When the temperature rises the rod *b*

straightens and the rod r is allowed to fall to a corresponding extent. When a reading is to be

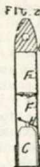


taken the screw y is made to bear against a brake z . The arm f is slightly elastic to yield when the temperature falls. A similar arrangement may be employed as a minimum thermometer.

4708. Jones, R., and Jones, J. Nov. 16.

Sounding depth of water.—The apparatus is described as applied in connection with ships' wells, but it is stated to be generally applicable. A float C in a tube carries a pawl H , running over a rack F hinged at G and kept in place by the removable cap B . Lugs on C (which also serve as pointers) project through slots in the tube and indicate the height of the water on a scale when the instrument is let into the well. To bring C again to the bottom, the cap B is removed and the rack F moved. Instead of the rack, pawls may be arranged in the tube and a notch in the float. The Provisional Specification describes an arrangement of pivoted pegs on a strip at the side of the tube. As the float rises it deflects these pegs, which then prevent its return, thus enabling the depth of the water to be ascertained by the sense of touch without a light.

Abridged also in Class *Registering &c.*



4851. Law, H. Nov. 23.

[Provisional protection only.]

Current meters.—The axis of the meter, put into motion by the current, imparts its motion to a vertical shaft enclosed in a tube closed at its upper extremity, the vertical shaft being carried to the upper part of the tube. An arrangement at this upper part enables the shaft, at one point in its revolution, to complete an electric circuit and thus to signal to the observer above the surface of the water, or to record the number of times the circuit is completed. As the air in the vertical tube is not able to escape, the water cannot interfere with the insulation of the electric current.

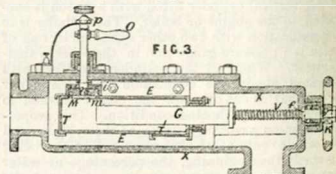
Abridged also in Class *Electricity &c., Div. III.*

4955. Cook, R. J. Nov. 29.

[Provisional protection only.]

Rulers.—On the under side of the ruler are bearings carrying two or more rollers. The upper surface is grooved longitudinally.

4967. Abel, C. D., [Brocq, F. A.]. Nov. 29.

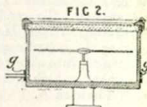


Hygrometer for determining the quantity of water carried mechanically by steam. The steam is admitted to the cylindrical vessel E within the chamber X by openings at T and T' which are closed simultaneously so as not to interfere with the pressure. By drawing out the plunger G , by means of a screw V and hand-wheel K , the volume of steam is increased, but it acts as a vapour in contact with its liquid as long as any water is carried by it; the pressure is not reduced but the water is converted into steam. Directly the pressure is slightly reduced it is indicated by a pressure gauge at M ; the free water is then all converted into steam and its volume can be calculated.

Abridged also in Class *Registering &c.*

5007. Readman, J. Dec. 1.

Compasses, magnetic.—In order that the motion of the compass card of a mariners' or azimuth compass may not produce currents of air, which will effect the reading, the card moves in a vacuum. The bowl may be exhausted through a tube which



is afterwards pinched and soldered up. Another way is by having a hoop *g* faced on the inside with leather &c., fitting round the bottom of the bowl. A small hole in this hoop is brought opposite a hole in the bowl, a tube inserted, and the air exhausted. The hoop is then turned and soldered fast.

5026. Sutcliffe, R. Dec. 2.

Level and clinometer.—The liquid is contained in a bent tube, vertical parts of which have scales marked on them. Under the level are adjusting-screws.



5105. Doubell, E. H. Dec. 7.

[Provisional protection only.]

Magic-lantern slides.—The effect of falling rain is produced on the screen, by the use of an opaque plate with translucent lines, marks, or perforations in combination with a movable semi-transparent screen moving over a pair of rollers, mounted on the slide.

Abridged also in Class *Toys &c.*

5319. Clark, A. M., [Burke, C. G.]. Dec. 18.
Drawings to Specification.

Magnetic compasses.—The dial or card has, in addition to the usual markings, a circle with divisions corresponding with the thirty-two ordinary divisions, and so numbered that an emission of sounds, corresponding in number and order of succession with the numbers marked, will indicate the divisions and consequently the compass points with which the divisions correspond. One, two, three, and four distinct sounds may represent the cardinal points N., S., E., W. respectively, and various combinations of these sounds indicate the intermediate points of the compass. The numbered circle is called the phonetic circle. It may be used in a compass with or without a needle and is designed to facilitate defining positions at sea or elsewhere, where the same cannot be ascertained by sight. The compass provided with this phonetic circle may also be combined with an apparatus, to be called a "cosmograph," for employing a code system wherein letters and numerals and the points of the compass are indicated by a set of four pointers moving over a scale consisting of three lines and three spaces, each representing a different sound to indicate a different letter &c.

Abridged also in Classes *Electricity &c., Div. III.; Writing-instruments &c.*

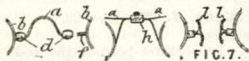
5382. Nawrocki, G. W. von, [Goerz, P.]. Dec. 22.

Spectacles and eyeglasses.—The bridge piece or nose rest is adjustable and changeable to suit the

varying distances between the eyes or other facial differences of persons. In one arrangement, Fig. 3, a screw *f* on the frame screws into a lug *d* on the bridge *a*. The screw may be on the bridge

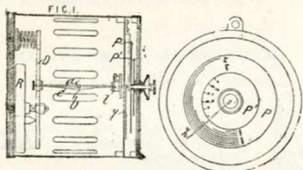
FIG. 3.

FIG. 6.



and the lug on the frame. In a modification, the bridge is divided into two in the middle, the two parts screwing into a common nut. In another form, pegs on the bridge fit into holes in lugs on the frame, being fixed by soldering &c. In Fig. 6 the two halves *a* of the bridge are secured in a cover piece *b* by a set-screw. Fig. 7 shows the application to eyeglasses; the nose rests *l* screw into lugs on the frame.

5386. Engel, F. H. F., [Klinkerfues, W.]. Dec. 22.



Weather indicators.—The movements of an aneroid barometer are transmitted through a hygroscopic string so as to register the combined change of barometric and hygroscopic conditions. A hand-adjusted wind index is added to allow changes of direction of the wind to be accounted for in prognosticating the weather. Figs. 1 and 4 show the arrangement with an ordinary aneroid R, the whole being mounted in a perforated case. The hygroscopic string *c* is mounted approximately parallel to the spindle *a* of the index finger Z and acts on an arm *b* on this spindle, being stretched between the lever *D*, which transmits the movement of the aneroid, and an adjustable support *l*. The motion of the spindle *a* may be magnified by a segment and pinion. The index Z registers on a movable dial P, Fig. 4, concentric, the wind index dial P'. The dials P and P' having been adjusted to correspond to the state of weather and wind in the forenoon, the pointer will show in the afternoon the weather for the following day, providing the wind has not changed. If the wind has changed, the dial P must be shifted through the corresponding angle on the dial P'. Fig. 5 shows the application of a "Bourdon" tube barometer. The hygroscopic string *c* is mounted between arms on the ends of the tube H, which is fixed in the middle, and the combined movements are transmitted to the index Z



through the lever arm *l* and rack segment *S*. In a modification there are two strings (one at each end of the tube) attached to opposite sides of a disc forming part of the segment *S*. In another arrangement, the tube is fixed at one end and a single string is attached to the free end.

5392. Moss, J. M. Dec. 22.

Microscopes.

Stands.—In whatever position the body of the instrument is turned a fixed ray of light always falls on the object. The body and the stage are fixed to an arm *C* jointed at *D* in the plane of the object, *C* turning in a vertical plane. The pillar *E* and plate *F* turn on a vertical axis which coincides with the optical axis, when the body is vertical.

Stages.—The slide is adjusted by two racks at right angles to each other, worked by pinions on a common vertical axis. A dovetailed groove runs across the lower revolving plate, in which slides a plate, carrying a pinion working with a rack in the groove. On this plate is a groove at right angles to the first, in which works a plate carrying springs &c. for the slide. This is also worked by a rack and pinion. The milled heads for turning the pinions are one above the other.



A.D. 1881.

77. McCallum, D. Jan. 6.

[Provisional protection only.]

Magnetic compasses.—Detecting amount of deviation of compasses on iron ships. In a box a weighted disc of wood carrying a pivot with card and needle is supported on gimbals. On the needle thimble is a knife point, the edge of which is in a line with the needle; over it is a strip of paper which passes round reels on the side of the box. On one of these reels is a ratchet worked by a pawl with a lever and spring. The paper passes through guides, fixed to the lever, on each side of the knife edge, and is kept in tension by springs on the reels; a pointer on the disc is set to correspond with the needle when on deck. The apparatus is hoisted up on a temporary or permanent wooden mast, and a cord, attached to the said lever, is pulled; the paper is thus marked, the amount of the deviation of the needle being seen by comparing the mark with the pointer.

151. Wenham, F. H. Jan. 12.

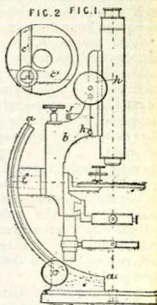
Microscopes.

Stands.—The *a* has its centre in the object, and is worked, between guides, by a rack and pinion or otherwise, a clamping-screw being provided. The limb *b* turns about *f*, the centre line of which passes through the object. The whole can turn round

a vertical axis on the foot plate. Whichever way the instrument is turned light falls on the object.

Fine adjustment.—Anti-friction rollers *h, h* are placed between the adjacent edges of the fine movement slide. The rollers are let into transverse grooves, and are kept in position by end flanges and by a swing bar or by an adjusting screw *j* and a spring plate.

Stages.—There is only one traversing-plate moved by two racks *c', c'*, Fig. 2, worked by pinions on a common vertical axis. The milled heads are one above the other, and may be above or below the stage.



345. Schoening, H. Jan. 26.

[Provisional protection only.]

Course indicator and compass corrector.—From the centre of a convex or concave mirror projects



a style perpendicular to the surface; above or below is a movable compass ring. The direction of the reflection of the style in the mirror is stated to give the direction of the true north and south. The whole is supported on gimbals. Part of the mirror may be transparent so that a side light may light the style and card and an azimuth style may be added. The image of the style may be reflected to a convenient position for the eye.

513. **Vayan, L.** Feb. 7.

[Provisional protection only.]

Combination pencil case, spirit level, and scale.—The pencil or pencil case fits into the open end of a tube containing spirit &c. and having openings closed with glass on its side. The pencil case may pass into or through the liquid, or the tube may have a lateral recess for the pencil. The liquid receptacle may be of glass enclosed in a sleeve which forms the pencil case. A scale denoting inches &c. may be marked on the tube.

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

556. **Opedorp, F. P. d'.** Feb. 9.

[Provisional protection only.]

Compasses; ruling-pens.—The invention relates to a wealemefta with which compasses or a ruling-pen may be combined.

Abridged also in Class *Registering &c.*

558. **Fischer, E.** Feb. 9.

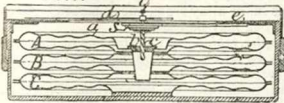
Ruling and compass pens.

—The penholder is formed with a hinged or other joint to enable the pen to be adjusted to any desired angle. Fig. 1 shows the apparatus in a writing-pen.

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

746. **Engel, F. H. F.,** [Möller, J. D.].
Feb. 21.

FIG. 1.



Barometers, aneroid. The diaphragm compartments A, B, C are in communication, the lower one C being fixed to the casing while to A is fitted a nut *b* the rise and fall of which causes a screw on the spindle *c* to rotate, the indication being shown by an index *d*. The spindle *c* is held up against a bearing *i* in the glass face and by a spindle *s*, or there may be a bearing at the other end of the spindle. To magnify the movements the nut *b*

may be attached to one end of a level, the other end being attached to a centre, the other end being attached to A.
Abridged also in Class *Registering &c.*

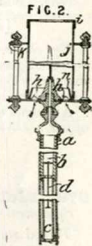
775. **Abel, C. D.,** [Loiseau, A., and Germeuil-Bonnaud, J. B.]. Feb. 23. *Drawings to Specification.*

Opera and field glasses are adapted for use as cameras by replacing the eye-piece by a photographic objective, and the objective of the glass by a focussing screen or sensitive plate holder. If both barrels are fitted in this way, stereoscopic views may be taken. Or the plate holder may fit on one barrel of the glass and the focussing-screen on the other, to serve as a view finder while the exposure is given. Or a small bellows arrangement fitted like an ordinary camera may be attached to the barrel of the glass, and the ordinary objective of the glass may be used in photographing. The photographic objective may be fixed in the eye-piece of the opera glass, and a cap carrying a double concave lens may be slipped over it when it is required for use as an opera or field glass.

Abridged also in Class *Photography.*

821. **Thorp, T., and Tasker, R.** Feb. 26.

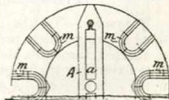
Photometers.—Relates to that class in which a flame is maintained at a given height, the amount of gas being consumed affording a measure of its illuminating power. The gas passes up a slightly-conical tube *b* and raises a disc on the upper end of a rod *d*: at the lower end of *d* is a small perforated disc which moves opposite a slot in *a*, against a scale indicating candle power. The burner used is either a jet as in Fig. 2 or an argand burner. The air supply *h* is annular and fitted with a conical deflector *n*. A mark on the chimney *j* or a plate *k* serves as a gauge for the height of the flame. If an argand burner is used the gas passes through wool &c. placed at the bottom of the burner.



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

843. **Haddan, H. J.,** [Lewis, J., and Brown, F. A.]. Feb. 28.

Compasses.—The needle A is rectangular with tapering ends and slots *a*. To the underside of the card horse-shoe magnets *m* are attached as shown, for the purpose of neutralizing local attraction; if those at the east and west points be stronger, the instrument is also more sensitive.



955. **Boye, L., and Müller, E.** March 5.

[Provisional protection only.]

Indicating the density and pressure of steam.—A cylinder of known volume is provided with a piston having a hollow rod in which works a screwed spindle of such pitch that one revolution will increase the space beneath the piston by one per cent. A wheel on the spindle is divided into one hundred so that $\cdot 01\%$ increase of volume may be read. The cylinder is surrounded by a jacket which (when a test is being made) is filled with boiler steam of the same density as that being tested and the cylinder space above the piston is filled with the same. The lower part of the cylinder is connected to one side of a pressure gauge and the jacket to the other. The piston is then screwed out until the mercury indicates a difference of pressure between the jacket and cylinder, and from the percentage of expansion necessary to produce this the density is calculated. A pressure gauge on the jacket will give the steam pressure. By a suitable valve communication can be made from the boiler to the jacket and cylinder below the piston or to the jacket only.

Abridged also in Class *Registering &c.*

973. **Nawrocki, G. W. von,** [*Cohausen, C. von.*] March 7.

[Provisional protection only.]

Eye shade.—The shade is inlaid with pieces of coloured glass or gelatine of any shape and in any manner which will ornament it. The amount of tone-colour is varied to suit different sights.

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

979. **McIlvenna, F.** March 8. *Drawings to Specification.*

Tripod stands.—In telescopic stands, instead of a set-screw fastening, a lever, preferably of hard wood, is inclined upwards at an angle of about 70° to the inner rod, so that when the latter is pressed down the lever is wedged against it.

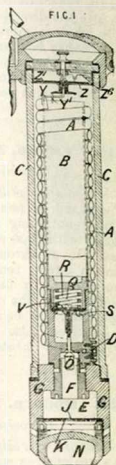
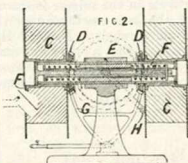
Abridged also in Classes *Advertising &c.; Fastenings, Lock &c.; Furniture &c.; Nails &c.; Photography.*

1022. **Corp, J.** March 10.

[Provisional protection only.]

T-squares.—To the outer edge of the stock is fixed a spring which presses against a slide block connected, through a slot in the blade, to a rod or wire extending the length of the blade, and on the upper side thereof. A second block is at the other end of this rod. When the spring bears against the first block the edges of the drawing-board are grasped by the inner edge of the stock and the second block. The T-square may thus be held at any position on the board.

1116. **Légé, A.** March 15.



Sounding-apparatus.—The pressure acts on a helical tube, or on pairs of discs, the alteration of shape of which actuates an indicator. The helical tube A, Fig. 1, is closed at its upper end and fixed to the core B at its lower end where it communicates by a narrow passage D with a chamber E, E. A plug F connects B to the casing G, on to which is screwed an airtight casing C. The chamber E is closed by an india-rubber diaphragm J, and together with the tube A is filled with liquid or air. The diaphragm J may be dispensed with and the liquid or gas into which the apparatus is plunged may enter the tube A: in this case, to prevent the pressure becoming so great as to injure the tube, a valve O may shut off the connection D between A and E. An airtight chamber Q has a spiral spring R fixed to a plate V which keeps the valve open. When the pressure of the water acting on the diaphragm S is great enough the valve O is raised. The upper (free) end of the helical tube A is attached to an arm Y which rests against a piece Y' attached to an index Z' moving over a dial Z. The index is brought back to zero by an arm Z'. In place of the helical tube A containing liquid it may contain air and the pressure exerted from outside. Instead of a tube, discs may be used, the pressure acting internally or externally.

Recording.—The indications of the index may be diagrammatically registered by electrical or other means in, or away from, the apparatus. An electric signal bell may be used.

Samples, taking.—At the bottom of the apparatus N may be tallow &c. or nippers &c. for bringing up samples of the bottom.

Casting-apparatus.—Two drums C, C, Fig. 2, mounted on an axle B, are fitted with bevel-wheels D, D, which are kept in gear with a bevel-wheel E by springs F. With this apparatus one line can be drawn in while another is cast. When only one sounding-apparatus is being used, one or other of the drums may be put out of gear by a forked lever G and handle G'.

**1158. MacDermot, F.** March 17.

[Provisional protection only.]

Measuring heights.—A handle, which is held vertically in the hand of the observer, has a forked end, within which a disc is supported on gimbals. The disc has a weight attached to its underside to keep it level. From the centre and from the edge of this disc rise two vertical rods of such lengths that a sight vane placed on the upper ends will form an angle of 45° with the disc. The position of the observer is changed until the top of the object is in the line of sight: the base line then indicates the height.

1277. Grant, H. G., [Prevot, A.] March 23.

[Drawings to Specification.]

Temperature indicator for paint-boiling stoves. A metal rod with teeth on its upper end passes into the interior casing of the stove and acts on a dial to indicate the temperature. A tube filled with carmine or other colouring-matter may also be used for this purpose.

Abridged also in Classes *Furnaces &c.*; *Stoves &c.*

1309. Henderson, A. C., [Montclar, J. M. A.]

March 24. [Drawings to Specification.]

Reflectors.—A detecting glass having a reflector or reflectors is fitted to street doors to see who is outside.

Abridged also in Classes *Boxes &c.*; *Buildings &c.*; *Electricity &c., Div. III.*; *Fastenings, Lock &c.*; *Fire-arms &c., Div. I.*; *Hand tools &c.*

1357. Bailey, W. H., [Zipf & Langsdorff and Berlin Anhaltische Maschinenbau Actien Gesellschaft, partly.] March 26. [Drawings to Specification.]

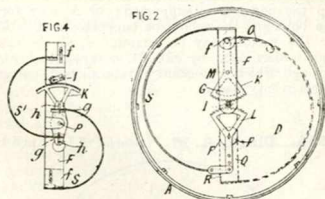
Pyrometers for hot-air engine furnaces. The heat is indicated by the expansion of a metal chain or rod, to which a dial may be connected. The pyrometer is placed in a pocket provided in the flue or chimney.

Abridged also in Classes *Air and gas engines*; *Bearings &c.*; *Chimneys &c.*; *Furnaces &c.*; *Heating*; *Mechanism &c.*

1383. Fowle, W. B. March 29.

Thermometers.—Relates to bimetallic thermometers in which two bimetallic strips are connected on different sides of the point of rotation, and so adjusted as to have a slight tension with respect to each other. In the arrangement shown in Fig. 2, the strip S is fixed at one end to the piece f and connected by a link R at the other end to the segmental rack L. The second strip is similarly connected to K or may be replaced by a spring O. The sectors K and L gear with a pinion I on the axis of the index. In a modification, Fig. 4, pins g, g on the bimetallic strips S' and S

move in slots h, h in a lever centred at P. The apparatus may be adjusted by moving the parts f, f. The lever centred at P may be set at an angle



with the frame so that the action of the strips will be at right angles to the slots h, h.

1417. Pass, M. D. March 31.

[Provisional protection only.]

Pyrometers, indicating-dials for. A graduated dial of enamelled iron is placed upon the indicator spindle and protected by a thick metal plate, having a small opening at the top and furnished with a stationary pointer so that only the portion of the dial indicating the heat is exposed. The dial may be coated with luminous paint when for use at night.

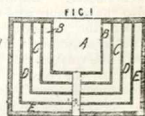
Abridged also in Classes *Registering &c.*; *Weighing-apparatus.*

1512. Lake, W. R., [Carter, R. A.] April 6.*Spectacles and eyeglasses,*

frameless. Fig. 3 shows the method of securing the glasses to the nose-piece or the wings. a, a are spring arms with projections b which fit into holes in the glass; a projection h also fits into a hole in the glass. The clip, with or without nose-piece, or the wing, may be stamped out of metal plate, and the part a, a twisted through a quarter of a revolution.

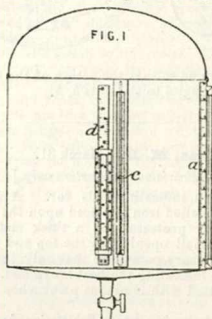
**1550. Gisborne, J. S.** April 9.*Compasses, protecting against local attraction.*

—The compass is surrounded by several series of concentric segmental or other shaped pieces of iron or steel, which also extend underneath the needle. Each piece is insulated by a non-magnetic material so that any polarization shall not affect the needle. Or there may be concentric chambers B, C, D, and E which are divided up by radial (or horizontal) plates placed alternately



midway between each other. All the partitions are of some non-magnetic material, and the spaces are filled with iron or steel filings. The central compartment A is cylindrical or conical, and at the top the compass is supported; or A may form the bowl and the whole be supported on gimbals. Or the needle may be surrounded, at the sides and underneath, by silk &c. covered iron wire, through which a constant or intermittent current of electricity passes.

1654. Clark, A. M., [Sourbé, T.]. April 14.



Specific gravity, estimating.—The Specification describes apparatus for ascertaining (1) the capacity of casks and other vessels, (2) the strength of spirits, and (3) the weight, volume, and density of liquids generally. The main feature consists in substituting for the ordinary slider or scale weight pan of a steelyard a vessel so as to allow liquid, of the same kind as that of which the volume is to be determined, to be used instead of weights. The vessel is fitted with gauge glass *b* and a scale *a* whereby the contained volume of liquid can be read, and also with a thermometer *c* and a movable scale *d*, for correcting indications and giving at one side apparent alcoholic strength and at the other the real strength at the normal temperature (15° C.). Another measuring-vessel is also used holding, say, a litre. The vessel whose capacity is required is first weighed empty; it is then filled and the vessel shown in Fig. 1 placed on the end of the steelyard arm, where it has a leverage of 100 to 1 against the cask. The vessel is termed a "densi-volumeter." Liquid is siphoned out of the cask into the measure and any surplus returned to the cask; the measure is then emptied into the "densi-volumeter" and the operation repeated until the quantity of liquid in the latter balances that in the cask. Suppose the liquid in the "densi-volumeter" to be 4.25 litres, five litres having been drawn out of the cask, then there will remain $4.25 \times 100 = 425$ litres in the cask, and its total capacity will be 430 litres.

The weight of liquid in the cask may be found in the usual way by putting weights in or on the "densi-volumeter."

The density of the liquid may be calculated from

the weight and volume. The apparent strength may be found from the density by reference to published tables and the real strength may be ascertained by making a correction, in accordance with temperature shown on the thermometer *e*, by means of the movable scale *d*.

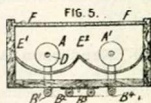
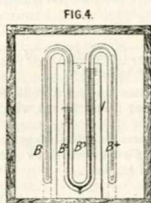
Abridged also in Classes *Brewing &c.*; *Weighing-apparatus*.

1693. Engel, F. H. F., [Becker, W. R. R.]. April 19.

[Provisional protection only.]

Sounding-apparatus for indicating shallows. One end of a spring, bent in a curve, is fixed to the keel or hull of the ship, and the other end slides in a guide in the keel or hull. To the centre of the spring a rod is fixed which works through a packed tube and actuates an index over a scale on deck &c. An alarm bell may be connected with the apparatus, which may be removable and may be worked through a trunk.

1751. Hurter, F. April 23.



Actinometers.—The two bulbs of a differential air thermometer are made to absorb rays of different refrangibility; the difference of temperature indicated serving

as a measure of the intensity of the light. To absorb different rays the bulbs are coated with coloured materials which are equal absorbers of radiant heat; or coloured strips may be placed inside the bulbs, or coloured glasses placed in front. For photographic purposes red and white colours are used, and for ordinary purposes black and white are used. The two cylinders A, A', which act as the bulbs, are connected at the bottom by the siphon capillary tube B, B', B', B', the limbs B' and B'' of which contain coloured liquid. Inside A, A' are rods around which wool D is wrapped, in one red and in the other white. The cylinders are placed in a box lined inside and outside with polished metal, and having a glass front F or a thickness of solution to absorb heat rays. The tubes B are placed outside the box and are provided with a sliding scale I. In the box are placed parabolic mirrors E', E'' to concentrate the light on the wool D. Should the cylinders be affected differently by radiant heat alone, the glass F in front of the most sensitive is covered with varnish, or both cylinders may be surrounded by other cylinders of adjusted lengths. Instead of an air thermometer a differential thermopile may be used; or an ordinary thermometer may be placed in different parts of the spectrum.

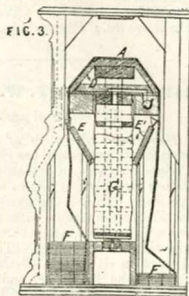
Abridged also in Class *Photography*.



1914. Lake, W. R., [Boynton, E. S.]. May 3.

Magic lanterns.—The apparatus is primarily for use as a station indicator in railway carriages. Slides or tablets F are strung together and pass over a table D, which is raised mechanically, or by a bellows G, so as to lift a slide from each pile, a projection on a heavy hinged stop E holding the front slide before an opening in front of the lamp. As the table descends the slide at the back falls again upon its pile.

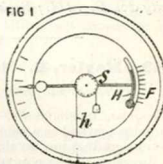
Abridged also in Classes Signalling &c.; Toys &c.



If d and a are made of the same metal, the error of the instrument is avoided.

2078. Engel, F. H. F., [Klinkerfues, W.]. May 12.

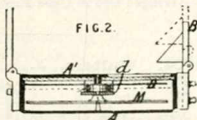
Hygrometers.—The movements of the hair string h are communicated to the disc S, on the axle of which is an arm carrying a pointer and a thermometer H. The pointer shows the relative moisture of the air and the reading of the thermometer on the scale F gives the dew point. The method of graduating the instrument is described. In a modification the thermometer may take the place of the scale F, while the scale is fixed to the arm. The instrument may be combined with an aneroid barometer, the scales being on the same dial.



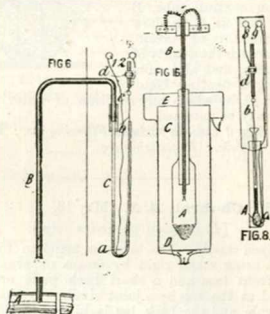
1926. Barker, F. May 4.

Combined clinometer and compass.

—The compass card M is mounted on a pivot at the bottom of the case A, the clinometer card D on an axis supported by the cover and by a bar d fixed to the sides of A. A portion of D is removed so that M may be seen. The prism B is adjustable so as to focus for either M or D. The clinometer card is so graduated that its zero will be opposite the prism. To readily bring the part cut away in D opposite the prism, the weight is made to rest against a projection on d where it is held by pushing in a stud. The clinometer card may be pivoted on a hinged cover, which is opened when the compass card is to be viewed, or it may be removed altogether or made much smaller than the compass card.



2110. Watt, A. May 14.



Thermometer.—The bulb A, Fig. 6, consists of a ring of copper pipe to which is fixed a narrow copper pipe B connected with a U-tube C containing mercury and having a platinum wire a fixed into its bend. Another platinum wire b is fixed to a screw c which can be adjusted to any position in the tube C by means of a nut d . The two platinum wires a and b are connected to binding-screws 1, 2, so that a circuit can be completed when the mercury is forced into contact with the wire b .

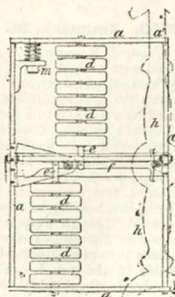
Mercurial thermometers may be constructed with similar electric connections as shown. The platinum wire a , Fig. 8, leading from a binding-screw 9 is fixed into the glass, and the wire b leading from a binding-screw 8 is fixed to an adjustable screw d .

Hydrometer.—A glass hydrometer A, Fig. 16, is formed open at the top and dipping into it is a tube B containing two insulated wires forming part of an electric circuit. The tube B is adjusted

2020. Mills, B. J. B., [Guichard, S., & Co.]. May 9.

Aneroid barometers.

—The object is to provide large dial apparatus for public use. d , d' are groups of barometric chambers of which the end ones are attached by the rods e to the lever f which operates the hand h as shown. To adjust the instrument, the lid of the box a is centred at a' and may be moved by a screw m .



at such a height that the mercury in the hydrometer bulb makes contact between the wires at any required density and so complete the circuit. The liquid enters the cylinder C through the bottom D and overflows into a large vessel E, so maintaining a constant level.

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

2143. Nayler, E. May 17.

[*Provisional protection not allowed.*]

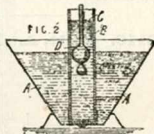
Compass, non-magnetic.—The dial of a pocket sundial is marked as a compass dial in addition to the time graduations, so that, the time being known, the direction of the points of the compass may be determined.

Abridged also in Class *Watches &c.*

2158. Fox, M. A., [Administratrix of *Fox, H. B.*] May 17.

Milk, testing, measuring.—A milk bowl A, graduated for measuring the contents, is provided with a central tube B graduated at C to show the amount of cream, and as such the quality of the milk, and also containing a floating lactometer D, by which any addition of water to the milk may be detected.

Abridged also in Classes *Filtering &c.*; *Milking &c.*; *Oils &c.*; *Registering &c.*



2168. Chabrel, E. J. May 18.

[*Provisional protection only.*]

Tripod stands.—The legs are made to fold, the joints being made rigid by means of pegs. The two front legs and a short back piece are connected at the top by a joint similar to that of a foot rule, and the back leg is hinged to the back piece to allow of adjusting the tripod in any direction. The stand is fitted with a cross-bar with a projecting ledge to support a canvas, music, or book.

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

2237. Thompson, W. P., [*Ligne, P. de*]. May 23.

Tripod stands, adjusting height of. The supporting stem B, sliding in the socket-tube A, is provided with a screw C and a nut D at the end, and a cork or rubber washer or washers E, which latter can be compressed by C and D as desired in order to make the friction sufficient to support the stem and top in any



position. A cap or packing at the end of A steadies the stem B.

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

2419. Panzera, F. W. June 1.

[*Provisional protection only.*]

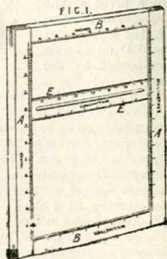
Range and deviation of shot, ascertaining.—A horizontal graduated bar is fixed to a pillar on a tripod in a slot in which is a second graduated sliding bar, at right angles to the first, carrying an eye-piece. In use, the fixed bar is made to stand parallel to the target, with its centre in the centre line of the same, and the other rod is set corresponding to the range. The amount of deviation allowed on either side of the target is indicated by pins on the fixed bar, and if the space between these pins be viewed, it will be seen whether the shots go wide or not. By the use of more pins the amount the shot goes wide will be seen. By setting the instrument on one side of the target and at right angles to it, it will be seen at what distance the shot strikes from the target, whether short or beyond it.

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

2704. Walters, J. F., and Pickering, W. June 20.

Rulers.—One or more of the frames A, B of school slates are marked with scales and are grooved to receive the ends of a strip of wood &c. E which slides on the slate and serves as a ruler. The strip E may be solid or slotted, and marked, scored, or perforated.

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



2953. Immisch, M. July 6.

Clinical thermometer.—A is a Bourdon tube filled with a highly-expansive liquid, and protected by vertical metal strips F, which also serve to increase the heating-surface. The outer end of A is fixed by a pivot E to a rack B gearing with a pinion C on the spindle of which is the index. Or the outer end may be fixed and the inner end butt up against a rack connected with the index.

Registering.—To enable the index to be fixed after a temperature is taken the spindle of C works in a bearing in a spring O. On turning the bow M through a quarter of a revolution the eccentric N releases the spring O, causing the pinion C to press against Q. The tube A and the inside of the case L are covered by a film of a highly absorbent substance. Instead of liquid the

tube A may be filled with a highly expansive and heat-absorbing vapour and the case be exhausted; or the tube may be exhausted and the case be filled

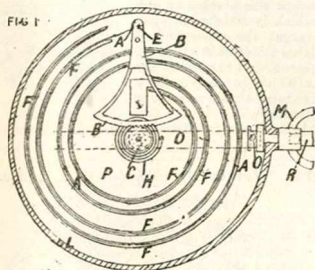
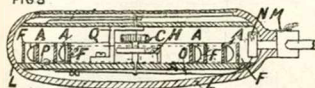


FIG 5



with the vapour. For surface temperatures the part in contact is a silver plate, on which the mechanism is fixed, and the rest of the case made of non-conducting material. The bow M may be split so as to introduce a long handle R.

Self-registering instrument.—By fixing a ratchet with fine teeth on the axis of C, the instrument can be made to register maximum temperatures.

2956. Brydges, E. A., [*Hamburger, W.*]. July 6.

[*Provisional protection only.*]

Surveying-instruments.—The parts are hung to the tripod by a universal connection in combination with a pendulum weight. The connection may consist of a ball-and-socket joint with or without suitable supporting arms, or the so-called "Cardan" arrangement of pivots and friction surfaces.

2971. Redfern, G. F., [*Terstegen, F.*]. July 7.

[*Provisional protection only.*]

Eyeglasses, folding.—The bow spring consists of two springs, one on each glass and pivoted at their free ends, so that the glasses will fold one upon the other without twisting of the spring, scratching of the glass, &c. When open, the glasses are held in position by projections on one spring fitting into holes in the other; or the free ends may be twisted, or one end bent downwards to act as a stop. The nose rests are made adjustable and the glasses may be inclined at any angle to the line of sight. A band spring twisted and bent upwards is fixed to the frame; at its free end is a stud which fits into a slot in a plate pivoted to the frame; by means of a series of notches in this plate the spring

may be set at various inclinations to the lenses. The upper end of the nose rest may be pivoted to a strip pivoted on the frame, and the lower end provided with a fork which may rest in notches on the frame. Or the pivoted end of the strap may be folded to form a friction spring. The nose rest spring may be in one piece with the bow spring or otherwise. The nose rest may be pivoted to the frame and held in any position by a projection on a spring fixed to the frame.

3121. Hart, G. W. July 18.

[*Provisional protection only.*]

Range-finder.—On a quadrant are placed two vertical wires, one fixed and the other capable of partial rotation round the first. The object is viewed through a prism in an oblique direction, and by comparing this view with the object seen directly, a chord of the circle of which the distance is the radius can be measured by means of the quadrant and the distance read off.

3172. Bassnett, T. July 21.

[*Provisional protection only.*]

Sounding-apparatus.—The gauge indicating the depth is formed by splitting a tube longitudinally to such a curve that when closed by a plate water entering the wide end will compress the air through equal distances for equal increments of pressure. The tube is used narrow end up, the water entering through a hole in the lower part. A gauge glass tube to show the water level is attached at the side.

Abridged also in *Class Registering &c.*

3418. Dillon, J. Aug. 8.

FIG. 3

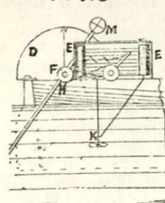
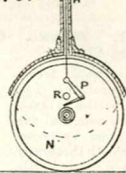


FIG. 9.



Sounding-apparatus.—Relates to apparatus for indicating and registering the depth of water, and for indicating to a certain extent the nature of ground of rivers, lakes, harbours, &c. In a hole in an axle on a boat &c. is a "sounding-rod" H at the end of which is a sounding-wheel N, Fig. 9, which rolls on the ground. The number of revolutions of N is recorded by means of a button R acting on a lever P attached to a wire X, which at each pull works a pawl with ratchet &c. in the dial box M indicating the distance travelled; or there may be bevel gear in N and M connected by a rod

running up H. The position of H is recorded by pencil &c. on a paper strip between two rollers E, E, the motion of H being communicated by a cord F. The drums E, E are actuated through the rod or wire X mechanically or electrically, or by means of a screw K in the water. To adapt the apparatus for use with various sized boats, a block of wood is placed across the boat and the axle is clamped against the sides of the boat by a screw. The dial M and paper on E may be dispensed with and a dial D may be used; the inclination of H is then noted and the distance travelled determined by sighting fixed objects. The nature of the ground will be indicated to a certain extent by the kind of vibration of H. If used with a steam or sailing vessel the indicating-mechanism is kept in the ship and the axle works through a stuffing-box.
Abridged also in *Class Registering &c.*

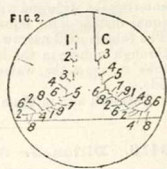
3492. Taylor, W. Aug. 12.

[*Provisional protection only.*]

Reflectors, manufacture of. A suitable metal is plated with white metal or silver and the surface burnished and plated with nickel.

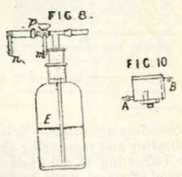
3729. Charteris, F., [Lord Elcho]. Aug. 26.

Range-finders.—A disc of glass &c. is placed between the eye-piece and the object glass of a telescope. The apparent size of infantry (I) or cavalry (C) is observed against separate step-like scales indicating the corresponding distance. Two discs may be used for short and long distances and for use in the same or different telescopes.



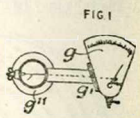
3741. Möcke, O., [Lesser, L. L. von]. Aug. 27.

Microscopes, freezing-apparatus for. Two bottles E stand side by side, and are connected by cross-tubes with three-way cocks p; one bottle is half filled with ether and on forcing in air the ether, and eventually air, is driven into the refrigerator and thence to the second bottle, the air from which escapes by a blow-off pipe m. The liquid can then be driven back into the first bottle. The tissue to be frozen is laid on the cover of a box, Fig. 10, the inlet pipe A, which ends in a rose, is connected up to one of the ether bottles E, the vapour passing out through a pipe B.
Abridged also in *Class Medicine &c.*



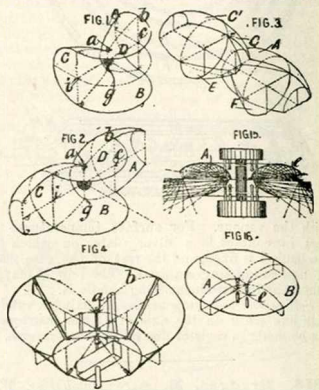
3856. Thompson, W. P., [Neuhaus, M., and Henniges, O.]. Sept. 5.

Hygrometer.—In the interior of a pipe g' is pivoted an arm to which is attached a piece of catgut the other end of which is attached to a tightening screw. At the end of the axle which projects outside the tube is a pointer moving over a dial g.



Abridged also in *Class Drying.*

3911. Wetter, J., [Wheeler, W.]. Sept. 9.



Reflectors.—The surfaces are generated by the entire or partial revolution of a conic section about its axis and also about an ordinate; in reflectors having upper and lower portions, the surfaces are formed either as above or by the revolution of two different curves about a common axis. In Fig. 1, the curve ab revolves about the axis ac and the latus rectum ag forming the portions AC and BD respectively. In Fig. 2, the line ab revolves about the axis and the latus rectum, being at the same time lengthened out when describing the part AC. In Fig. 3 the reflector consists of two ellipsoidal portions AC', united to two hyperbolic portions E, F. Between the two quadrantal parts of both the ellipsoidal reflecting-surfaces C, C' and the hyperbolic surface E may be inserted sectors of surfaces generated by the revolution of the said curves through any suitable angle about their common vertical ordinates. In Fig. 4 the upper portion is generated by the curve ab, and the lower portion by a different curve, both revolving around the same axis. Fig. 5 shows a reflector for an electric light, the carbons being situated at the focus. A space within the vertex is left to accommodate the lamp standard, mast, &c. In cases where the diffusion of light is not required for the whole of the 360° of the circle, a portion may be stopped off. In Fig. 16 the reflector has two

portions A, B, each with separate foci e , but both generated by the same curve which moves through 180° around the *latus rectum*, then moves horizontally (without revolving) a space equal to the distance between the two foci, and then describes another half revolution. The above-described forms of reflectors may be formed of sheet metal by spinning or other means either in pieces, afterwards fastened together, or in one piece. They may be of silvered glass, or be lined with numerous small lenticular or other plane pieces of silvered glass.

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

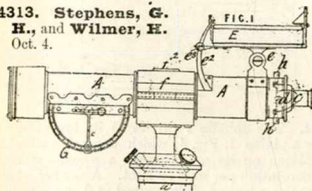
4181. Promis, L. M. Sept. 28.

[*Provisional protection only.*]

Opera glasses.—Consists in fitting walking sticks with opera glasses. A cavity in the head of the cane is covered by a concealed lid. Within the cavity on one side is a slide to which is jointed at its upper end a ring, which with other rings sliding one into the other forms the barrel of the opera glass. These rings are limited in their action by studs on the one entering slots in the next. On lifting the glass out of the cavity for use, a crutch on the other side of the cavity is thrown up by a spring, and serves as a rest for the barrel when drawn out to its full length.

Abridged also in Class *Umbrellas &c.*

**4313. Stephens, G.
H., and Wilmer, H.**
Oct. 4.



Telemeter.—Relates to a surveying-instrument capable of determining the distance of an object, its magnetic bearing, and its angular elevation. In the telescope A is a diaphragm c with two horizontal parallel hairs d, d , the distance apart of which bears the same proportion to the focal length of the object glass as the divisions on the staff subtended by the hairs do to the distance to be determined. The distance apart of the hairs may be adjusted by screws h which move the two halves of the diaphragm in guides.

Compass.—The magnetic direction is indicated by the compass E, which is levelled by turning it about e and by turning the telescope in a hinged collar f , clamped by screw f^2 ; E is clamped by a screw e^3 to the arc e^1 .

Clinometer.—A weighted index G indicates the inclination.

4339. Lazarus, N. Oct. 5.

[*Provisional protection only.*]

Lenses.—Relates to the manufacture of achromatic lenses, which may be made thin for spectacles &c. A piece of flint glass and a piece of crown

glass with flat polished surfaces are welded or cemented together and the piece worked as a single glass.

4365. Adie, P. Oct. 7.

[*Provisional protection only.*]

Spectacles.—Describes means for seeing behind. The glasses are made of extra width, or with a movable or fixed frame fitted outside the eye rings. The outer portions of each lens (or the lenses in the movable frames) are made with mirrors. For clearer vision the inner portions of the lenses or glasses are darkened.

4370. Jones, E. Oct. 7.

[*Provisional protection only.*]

Saccharometers &c.—From the shorter arm of a beam supported on knife edges is hung a vessel to be filled with the solution to be tested. The longer arm has a sliding weight which indicates on a scale the specific gravity, or lbs. per gallon, &c. On the supporting pillar is a guide for the shorter arm on which is a scale over which a pointer on the said arm moves; this pointer and scale indicate the position of equilibrium, and may also show tenths of the degree shown by the sliding weight. Instead of indicating tenths in this way there may be a second sliding weight on the shorter arm. The specific gravity of other liquids and also of solids may be determined by this instrument.

Abridged also in Class *Brewing &c.*

4414. Brydges, E. A., [*Kronecker, H.*].
Oct. 11.

[*Provisional protection only.*]

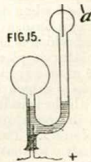
Thermograph.—A mercurial thermometer is fixed radially in an aperture in a clock face in such a way that no light shall pass through to the back except that which passes through the bore of the thermometer not occupied by the mercury. Attached to the hour-hand spindle, behind the clock face, is a frame carrying a sheet of sensitized paper which is marked with circles to indicate degrees and radial lines for the hours.

Abridged also in Class *Photography.*

4454. Sprague, J. T. Oct. 12.

Thermometers, alarm.—The instrument consists of an air bulb with a U tube the liquid in which completes electric circuits at the upper and lower limits. Contact is made at the lower limit of temperature by the liquid between the + and - terminals, the latter being insulated except at the tip. When the higher limit of temperature is reached the terminals + and a are put in contact.

Abridged also in Classes *Electricity &c.*, *Div. III.*; *Fire, Extinction &c. of*; *Heating.*





4493. Royle, J. J. Oct. 14.

[Provisional protection only.]

Barometers.—A corrugated steel diaphragm, deflected by the pressure, causes an enclosed coloured liquid (preferably consisting of alcohol in which fluorescein is dissolved) to rise and fall in a glass tube.

Abridged also in *Classes Air and gas engines; Bearings &c.; Registering &c.; Weighing-apparatus.*

4580. Schwartz, J. Oct. 19.

[Provisional protection only.]

Sounding-apparatus.—Vessels are provided with one or more "feelers" consisting of two rods, one from each side of the ship, meeting about 50 feet beneath the keel and fitted with means for sounding an alarm on touching the bottom. They may be drawn in, partly to vary the depth, or altogether. Each rod contains an insulated wire connected with battery and bell &c. on board. The contact-maker consists of a divided metal cup, the two parts being insulated from each other; a metal ball is suspended, by insulated claws &c., in the cup, so that when it touches the ground contact is made. Instead of the "feeler" a chain ladder, rope, &c., weighted and kept vertical by stays, may be used. The invention may be applied to ordinary sounding-apparatus, two insulated wires being used within the sounding-line.

Casting apparatus.—To compensate for the way of the ship, the sounding-apparatus may be expelled in front of the ship by compressed air, rocket apparatus, &c., so that a vertical sounding is taken.

4973. Haddan, H. J., [*Woschnagg, A. C.*] Nov. 14.

[Provisional protection not allowed.]

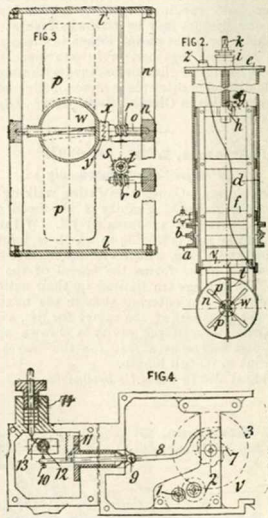
Hydrometer for discriminating between pure and falsified wines. It is a "simple liquid meter" with a mark that indicates a specific gravity of 1.001 at 15° C., this specific gravity being "the least genuine pure wine can possess." The instrument is simply dipped into the wine.

Abridged also in *Class Brewing &c.*

4995. Kelway, C. E., and Dyer, F. Nov. 15.

Logs and current meters.—Improvements on those described in Specification No. 2292, A.D. 1877. In this arrangement a hole is formed in the ship's bottom *a*, Fig. 2, through which the log is passed when desired. When not in use it is withdrawn into a casing *d* in which is a sluice valve *b* and which is closed at the top by a cover *e*. The rotator is placed in a short tube *l* and carries two or more adjustable helical blades *p* mounted on a boss *w* which is connected by a clutch *x, y*, Fig. 3, with the spindle *o* whence the indicating-mechanism is driven through a worm *r*, worm-wheel *s*, and spindle *t*. The rotator can shift slightly along the shaft *o* so that if the ship's motion is reversed the clutch *x, y* is thrown out of gear and re-engaged when forward motion is resumed. The shaft *o* and spindle *t* are mounted preferably in lignum vite bearings *n, n'*. The tube *l* is secured to a frame *f*

which is moved up and down by a screw *g* working in a nut *h* and passing through a stuffing-box *i*. The frame *f* may be jointed so that the shaft *o* is horizontal when in use, even if the vessel's bottom



is not. The spindle *t* carries at its top within a box *v* a pinion 1, Fig. 4, which through a wheel 2 and pinion on its arbor drives a wheel 3 making one revolution per mile or knot. A ratchet-wheel 7 operates a lever 8 fulcrumed at 9 and carrying a stud 10, preferably platinum tipped, which makes a series of contacts with a surface 12, preferably of platinum. An electric circuit is thus completed, through an insulated wire 13 (passing through stuffing-boxes 14 and *z*) and the metal work of the log apparatus, operating an indicating-apparatus in any convenient part of the vessel. Water is excluded from the contact compartment by an india-rubber tube, fastened at one end to the lever and at the other to the passage through which it passes. The contacts may also be made by springs pressed together by a hinged stud at the end of the lever 8. A bell &c. is connected with the recording-apparatus and sounds at every electric contact. If it is desired to call an officer after a certain distance is traversed an adjustable hand is set in advance of the indicator hand; when the latter overtakes it a circuit is completed and a bell sounded. Two batteries are provided, one only being in use at a time; to prevent accidental contacts while changing, a wheel actuated by the apparatus is arranged so that a current from one or other is constantly passing through it to the insulated wire circuit.

Abridged also in *Classes Electricity &c., Dir. III.: Steam engines.*

5041. Sims, J. Nov. 17.

[Provisional protection only.]

Set-squares.—Three thin strips of wood are mitred together and across the mitres roughened metal strips are placed; over these are glued three more strips similar to the first; the whole is then pressed in a mould. If metal edges are to be provided, they are placed between the strips.

5130. Woodford, R. F. Nov. 24.

[Provisional protection only.]

Optical instrument "for demonstrating the crossing of the optic nerves."—A tube has an eye-piece, and a diaphragm behind a contracted aperture of the tube, so that only rays parallel to the axis can enter the tube. The tube is coated on the inside with lampblack. The diaphragm may present a variable aperture or shut out the light. In use the instrument is applied to one eye and an object placed in front of the other and at a distance shorter than the tube.

Abridged also in Class *Toys &c.*

5306. Beger, C. Dec. 5.

[Provisional protection only.]

Level and plumb-rule.—In a box, on a straight edge, is pivoted a heavy index pointer which is viewed through apertures in a plate forming the front of the box.

5368. Mucklow, J. D., and Spurge, J. B. Dec. 8.

[Provisional protection only.]

Actinometers and photometers.—The light passes through tubes at one end of each of which is a stencil plate and at the other a diaphragm with the required aperture. The apertures of the diaphragms will vary through the series according to the ratios required. The film or other material to be tested is placed below a stencil plate and covered in to exclude extraneous light. The tubes may be grouped together as required.

Abridged also in Class *Photography.*

5492. Bolton, T. Dec. 15.

Range-finder.—Relates to range-finding apparatus in which mirrors are set at definite angles. A box C, Fig. 1, has two mirrors *d, d*, in the upper part, at an angle of 45° so that they reflect a right angle. Two mirrors *e, e* in the bottom part of the box reflect an angle of $88^\circ 34' 4''$. Between these two sets of mirrors are holes in the side of the box.

In use the box is placed at A, Fig. 5, and placed at B, so that it coincides, as seen directly, with the image of the distant object O as seen in



FIG. 1.

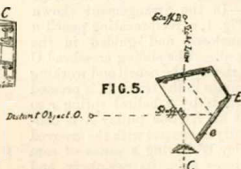


FIG. 5.

the upper mirror. At C the image of the distant object O as reflected by the lower mirrors coincides with the staves A and B seen directly. The distance AC will be $\frac{1}{20}$ th of the distance of the object, this fraction depending upon the angle of the lower mirrors, which is not necessarily $88^\circ 34' 4''$. At night, to measure the distance of camp fires &c., small lamps &c. may be attached to the staves. The apparatus may be divided into two parts and used by different persons at the points A and C. In the Provisional Specification it is stated that a telescope with parallel cross hairs attached to the box may be used, by sighting a horizontal scale attached to the stand A, to measure the base. A method of finding the range of a moving ship &c. is also described.

5511. Hutton, D. B. Dec. 16. Drawings to Specification.

Straight-edge and compasses.—An instrument used for measuring the pitch of screw propellers, consisting of two legs pivoted together, may be used as a straight-edge and also as a pair of compasses by putting loose ends on.

Abridged also in Classes *Registering &c.*; *Ships &c.*, Div. II.

5512. Hughes, R. H. Dec. 16.

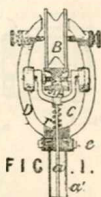
[Provisional protection only.]

Ship's course, laying-off on charts &c.—On a compass card is centred a revolving bracket carrying a block which slides in a slot in a rule, one edge of which lies over the centre of the card. In use the ruler is placed against the points on the chart and the card set with the meridian and then turned through the angle of magnetic deviation: the rule edge will then indicate the course. To easily get the north and south bearing there may be a number of lines on the card parallel to the north and south line.

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

5519. Johnson, J. H., [*Henestrosa, I.*].
Dec. 16.

Shading-machine for drawings &c.—In the arrangement shown in Fig. 1, a reciprocating pencil *a* is enclosed and guided in the case *a'*. The sliding crosshead *C* attached to the pencil and working in guides in the frame *D*, is pressed upwards by a helical spring *r* so that its friction pulley *A* is constantly in contact with the grooved pulley *B*² having a series of cam surfaces upon its periphery, and receiving motion through the intervention of an endless band.



Modifications in the arrangement of parts are shown, in one of which a triangular cam, connected to the wheel *B* or on a counter shaft actuated thereby, works in a reciprocating frame connected to the pencil. By these means the pencil is made to reciprocate at any desired speed. An elastic driving-band is employed, to transmit motion from an overhead cylinder, actuated by a treadle or clockwork, and to support the weight of the pencil which is guided by hand. Non-elastic gear may be employed in which case a spring is interposed between the actuating-mechanism and the pencil. The support of the said overhead cylinder may be secured to a table or desk or be provided with a foot to rest on the floor. The pencil may be suspended from a small pulley or traveller running on a horizontally-stretched wire or bar. When provided with a foot, the support for the driving-cylinder may be telescopic, the upper horizontal portion being hinged to the vertical part, in order that it may fold up into small compass. Treadles or clockwork may be arranged in the base and multiplying-gear may be provided.

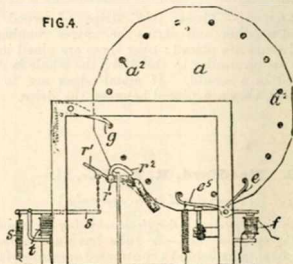
Abridged also in Classes *Artists' instruments* &c.; *Writing-instruments* &c.

5638. Webster, E., and Williams, T. M.
Dec. 23.

Magic lantern for advertising.—Relates to automatic apparatus operated by clockwork and electricity. Upon a disc *a* are mounted a series of slide carriers secured by bolts *a*². A rope carrying a weight is wound on the axis of the disc so as to produce a constant tendency to revolve. An

escapement *e* operated by an electromagnet *f* controlled by clockwork allows the disc at stated

FIG. 4.



intervals to move through the space between two of the bolts *a*². The arm of the escapement gears with the ends of the bolts *a*², and a lantern is so arranged as to show one of the slides every time the disc is stopped. An arm *e*² stops the motion of the disc if the magnet *f* does not release the escapement through any failure of the apparatus, and an arm *g* prevents return motion. The gas cock *r* is arranged so as to be automatically closed by an electromagnet *t* (controlled by clockwork) at the end of any desired time, and to be opened by the action of the bolts *a*² on the arm *r*² when the disc is re-started, by the recommencement of the action of the escapement *e*. Modifications are described.

Abridged also in Classes *Advertising* &c.; *Electricity* &c., *Div. III.*; *Toys* &c.; *Valves* &c.; *Watches* &c.

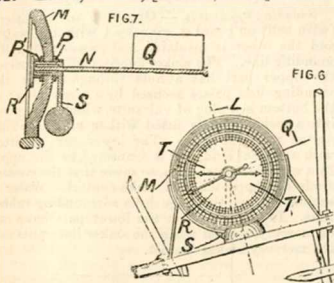
5672. Evans, R. Dec. 27. *Drawings to Specification.*

[*Provisional protection only.*]

Compasses, correcting.—The steering-compass has in addition to the usual lubber's line, a movable lubber's line. A second compass is gimballed on the end of a pole which is projected over the side of the ship, to place it out of reach of the ship's influence. The card of this compass has a graduated raised edge and a transparent bowl, so that by a telescope or series of reflectors its reading may be taken, and the steering-compass set to the same reading by the movable lubber's line which is worked by a tangent screw

A.D. 1882.

31. Lake, W. R., [Petersen, E. W.]. Jan. 3.



Clinometers and course indicators for aerial machines. A dial or scale M, Figs. 6 and 7, is mounted in the car. A weighted lever S is attached to one end of a rotary sleeve P, at the other end of which are two pointers T, T' which mark the real horizon and indicate the inclination of the vessel on the dial M. Passing through the sleeve P is a rotary spindle N, at one end of which is a flag or vane Q, Fig. 7, and at the other end an index or finger R which exactly balances the vane Q. When the vessel ascends, the speed causes a certain pressure upon the flag Q, causing the shaft N to rotate, so that the index R points towards the direction in which the air ship is truly proceeding against the air and indicates the true amount of drift that the vessel makes.

Abridged also in Classes *Aeronautics*; *Gas manufacture*.

68. Fenby, J. B. Jan 6.

[Provisional protection only.]

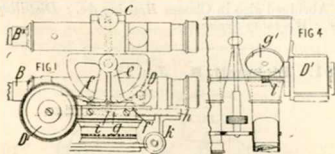
Kaleidoscopes.—Two or more pairs of mirrors are used, each mirror being placed to the other at an angle of some regular polygon. The objects move in a plane at right angles to the mirrors, on bands or on rotating discs, or a number of rotating discs may be mounted on a large disc worked by clockwork. The objects may be fixed and the mirrors movable.

Abridged also in Class *Toys &c.*

227. Hart, G. W. Jan. 17.

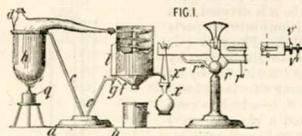
Range-finders.—A fixed telescope B, Fig. 1, is mounted on a base-plate *h* and a movable telescope B' mounted on standards *e* is worked vertically by an arc and pinion D and is rotated axially by a tangent screw *c*. The stands *e* are fixed to a revolving base-plate *f* under which is a revolving plate *g* graduated in degrees and gearing

with a screw on the axis of a micrometer drum D'. A pin *i* on a catch *f* rests in holes in the plates *f* and *g*; or a clamp *k* may be used. In use, the



instrument is placed on a tripod; the plate *g* is placed at zero, and the object is sighted; the base-plate *f* is then turned through 90° and a staff put in the ground in the line of sight. The instrument is moved to this staff and the original station sighted; the plate *f* is turned through 90°, and the drum D' is then turned, which revolves *g* with *f* until the object is sighted. The distance is indicated on the drum. Fig. 4 shows a range-finder for use at sea. In the tube of one of a pair of telescopes is fitted a prism which can be revolved by a drum D' with screw *l*, gearing with the index plate *g*. One telescope shows the real horizon and the telescope with the prism in shows the horizon elevated or depressed; the amount of rotation required to raise the object to the level of the horizon will indicate the distance. With the same scale on the drum D', the instrument must always be used at a definite height above the sea level.

250. Haddan, H. J., [Deréze, J. & J. B.]. Jan. 18.



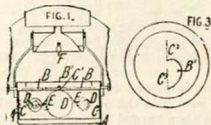
Specific gravity, estimating.—To ascertain the proportion of alcohol in an alcoholic liquid, a certain quantity is distilled, and the result weighed. The still and condenser are supported on a base *a, b* by rods *c* and *e*, the former terminating in a ring *d* and the latter in a vertical rod *f* fitting into a recess *l* in the condenser. The beam of the steelyard *r* is limited in its swing by pieces *r', r''*, and carries a toothed wheel which can be moved along the beam by an endless screw turned by a head *e*. The other arm carries on a knife edge a ring *x'* for supporting a vessel *x*



which collects the distillate. To use the apparatus, the vessel x is filled with water to a certain mark, the movable wheel moved to the end by turning the head r and the balance brought to equilibrium by adjusting a head v . The vessel x is then emptied, and a certain quantity of the liquid to be tested is placed in the still. When the distillate reaches the fixed mark in the vessel x , the still is removed and the toothed wheel is moved along the beam until equilibrium is restored. The reading of the scale on the beam then indicates the strength of the liquid.

Abridged also in Classes *Brewing &c.*; *Distilling &c.*; *Weighing-apparatus.*

251. **Pickwell, R.** Jan. 18.



Course recorders.—Beneath the compass card B is a box C, containing clockwork D, which moves a band of sensitized paper E. Or the clockwork may move separate strips or light slits, the necessary light being given by a lamp F. In the case C are slits C^1 , C^2 , and in the compass card is another slit which, whenever it crosses either of the slits C^1 , C^2 , allows a pencil of rays to pass and photograph a black spot on the paper beneath, thus recording the course. The course may be recorded electrically by leading from the compass card a delicate trail piece which moves over a ring of insulated armatures, and thus operates pricklers to pierce a travelling band. The pricklers are placed side by side, one for each quarter point.

264. **Bassnett, T.** Jan. 19.

Sounding-apparatus of the pressure-gauge type. A tube a is divided by a partition b into two parts c and d . The part c is open to the water by holes l , and leads by an opening e to the closed part d , to which is connected a glass gauge j with scale and protecting hinged cover. The partition b is so formed that the divisions of the scale may be of equal length. In use, water passes into c through l , compresses the air, and flows through e into d ; when the apparatus is drawn up, the water flows out of c , but is retained in d . A cock m is fitted to the outlet of d .



The apparatus is loaded or attached to a sinker. In a modification a closed glass tube is attached by a flexible joint to a metal tube, open at its lower end, by its side; in case of breakage any part may be replaced.

358. **McEvoy, C. A.** Jan. 24.

[Provisional protection only.]

Sounding-apparatus.—One wire of a battery (with bell) on board is connected with the water, and the other is insulated and passes within the sounding line. The sinker consists of two parts; the upper part has a hole through which the sounding line passes secured by a screw plug; at the bottom is a plug of vulcanite, which is screwed into a socket, and is fitted with a metal cap connected with the wire. The lower part is fitted with a contact stud, and is connected to the upper by a cage of metal bars, so made that the contact studs can approach and make contact. Water is excluded from this cage by a surrounding rubber tube. In a modification the lower part has a cup of mercury, so that when the sinker lies on its side the mercury makes contact.

668. **Navrocki, G. W. von,** [Redlich, T.] Feb. 11.

[Provisional protection only.]

Plumb rules.—A pendulum is mounted in a case and is fitted at its lower end with a pointer which is centrally pivoted upon it. The upper arm of the pointer has a vertical slot into which fits a pin fixed to the casing; the lower arm projects through the bottom of the casing. The pointer may be pivoted on the casing and the pin fixed to the pendulum.

747. **Pear, A. H.** Feb. 16.

[Provisional protection only.]

Lenses.—A magnifying-lens may be mounted on the handle of a rotary-disc cutting-tool.

Abridged also in Classes *Cutlery*; *Cutting &c.*

783. **Benvenuti, F. F.** Feb. 17.

Ruling pens, reservoir.—On the upper end of a tubular reservoir holder is screwed a cap having an aperture through which a rod passes into the reservoir. A cap also screws on to the upper end of the rod. Below this and within the reservoir the rod has a flange on which rests a piston of cork &c., which is held thereon by a flange screwing over it on the rod. Into the lower end of the reservoir screws an ink feeder, consisting of a small plug having a conical aperture through which the lower end of the rod passes. The larger diameter of the aperture, which is downward, forms a cushion for a conical valve screwing on to the ink feeder, which valve may be formed by the bevelled upper end of the ruling or writing point. A point, equally suitable for ruling or writing, is provided with a series of grooves along which the ink flows to the pointed end. A hollow cap or ink protector or regulator passes over the point and screws on to the ink

feeder. It tapers down and terminates near the end of the point. The points may be made in two parts, the upper being hollow and the lower, if desired, being formed to carry an ordinary pen. By unscrewing the cap at the upper end of the rod the conical valve will be closed. Screwing it tight will open the valve and allow the ink to flow to the pen. Air may be admitted to the hollow to ensure a continuous flow of ink if desired, the air valve being so arranged that it can be closed when the pen is not in use.

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

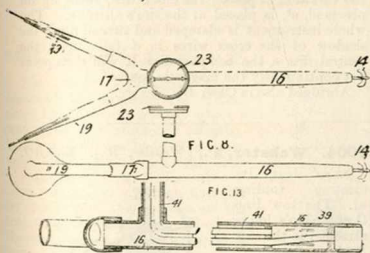
787. Duncan, W. H. Feb. 18.

[*Provisional protection only.*]

Sounding-apparatus for indicating shallows.—In front of a pilot boat (which is connected with, and propelled some distance in front of, the ship) are a buffer and two anchors hanging in the water below the depth of the ship's draught; these are connected to a lever in communication with a valve in the pipe which conducts water to the hydraulic propelling machinery. When this valve is opened by the lever in case of the anchors touching the ground, the pressure of water in the pipe is diminished, the change of pressure acting as a cataract on the ship which reverses the ship's engines, and blows a steam whistle. The opening of the valve also completes an electrical circuit and gives a warning in the engine room.

Abridged also in Classes *Ships &c., Divs. I. and II.; Signalling &c.*

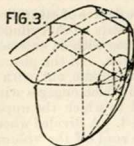
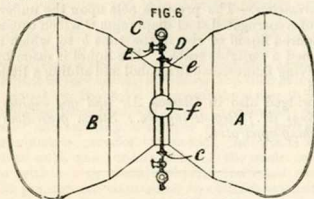
871. Davison, T. Feb. 23.



Speed of ships, indicating.—The apparatus is fixed to the bow of the ship so as to project into water which is practically undisturbed. In the modification shown in Figs. 7 and 8, a screw 14 at the end of a tube 16 is acted upon by the pressure of the water due to the forward motion of the vessel. It communicates its motion by means of worm gearing to a dial and counting mechanism 23 at the end of a vertical tube which also serves to support the apparatus. The saddle piece 17 bearing on the stem of the ship has arms attached to it provided with blades 19 which serve to steady the

apparatus. In a modification the ship's stem is fitted with an aperture through which the tube which carries the screw may be thrust from the inside, the dial being carried by this tube at its inner extremity. A rotating set of hemispheres may be used instead of the screw. In another arrangement a ball or plunger pressed out by a spring replaces the screw, the motion being transmitted to the indicator by a rack and pinion. In a further modification, Fig. 3, the water pressure is directly communicated through tubes 39 and 41 to a mercurial siphon pressure gauge supported in gimbals on deck. By connecting the tubes 39 and 41 to separate chambers in the tube 16 as shown, the difference in height of the mercurial columns will represent pressure due only to the forward motion of the vessel.

917. Haddan, H. J., [Wheeler, W.] Feb. 25.

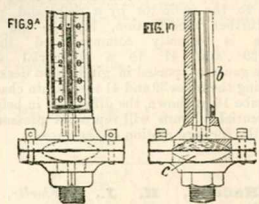


Reflectors.—The reflecting-surfaces are generated either by the revolution about its principal axis of a curve which is variable throughout its revolution, or by the revolution about two or more axes, successively, of a curve which is variable throughout its revolution, about one or more of the axes. The generating curve always "has a focus common to the variations thereof, and an ordinate common to the curve in all its variations." Fig. 3 is an isometric elevation of a single reflector, showing the lines of development. Fig. 6 shows the plan of a double reflector arranged for an electric lamp. The truncated inner ends of the two reflectors A, B, Fig. 6, are united by means of hinge and like joints with pins *e, e*. The reflectors are attached to two vertical rods forming a part of the frame of the electric lamp by clamps C hinged to ears on the reflector A, cylindrical insulators D being interposed. Each clamp C is furnished with a screw E working into the ear and firmly holding the insulating tube and the rod. The reflectors are notched at *f* forming a vertical passage for the

carbon pencils. The hinge joining the separable parts may be dispensed with, the clamps remaining as described.

Abridged also in Class *Lamps* &c.

927. **Royle, J. J.** Feb. 25.



Barometers.—The pressure acts upon the underside of a corrugated steel diaphragm C which causes a coloured liquid to rise in the tube *b* to which is attached a suitable scale. The liquid is made by dissolving fluoresceine in alcohol and adding a little alkali.

Abridged also in Classes *Air and gas engines*; *Bearings* &c.; *Registering* &c.; *Steam generators*; *Weighing-apparatus*.

929. **Boye, L.** Feb. 25.

[Provisional protection only.]

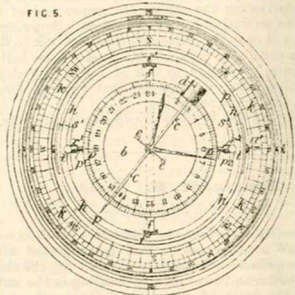
Hygrometer for indicating the degree of saturation of steam. The apparatus consists of a cylinder of known volume, communicating with an external jacket, and provided with a piston. In the piston-rod, which is hollow, works a spindle cut with a screw thread of a certain pitch which engages with a female screw in a crosshead to which the upper end of the piston-rod is attached. A divided wheel and an index are employed to read off the volume of the cylinder. A steam-gauge communicates with the cylinder into which steam is caused to enter and remain at a constant temperature and pressure. When the piston is raised sufficiently the volume increases and the steam passes from a saturated to a superheated condition. The change results in an alteration of pressure which is indicated by the gauge.

933. **Wilson, J. J.** Feb. 25.

Compass correctors.—A dumb card or dial marked with quarter points but preferably in the reverse order, and a ring graduated from the north point to 180° both ways, together work in an outer gimballed ring, marked with an index line and the words "ship's head." By means of a central screw, the dial and ring may be fixed relatively to each other and to the outer ring. The graduated ring is also divided on its outer edge for easterly

and westerly variations and marked with P.M. and A.M. points at about 90°. A sight vane is mounted in the centre having a fine wire stretched between the upright part and the point. In Fig. 5

FIG. 5.

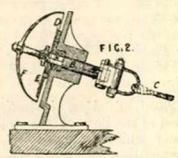


the instrument is combined with a clock and central dial *b*, mounted on a ring *p*. This ring has arms *p*¹, *p*² attached, to which are fixed, by means of the bosses *r*¹, *r*², grooved slides *s*¹, *s*². The sidereal time ring *h* is free to move circumferentially in these slides and may be clamped by the screw *t*. The bosses *r*¹, *r*² form bearings for the pivots *u*¹, *u*² on which the compass dial *k* may turn. At the points 12 and 24 on the clock, the ends of a graduated sector *f* are attached which is fixed in any position relatively to an outer ring *f*¹. *f* by the screws *g*¹, *g*². The clock marks civil time and gives motion to a pointer *c* provided with cross wires in *d* and also a disc *e* with slight slot. In use, the clock is set to local time, the sidereal ring to the equation of time, and the outer compass dial *k* to the variation at place; the clock dial, swinging on pivots *u*¹, *u*², is placed at the sun's altitude. The whole instrument is clamped and turned until the shadow of the cross wires in *d* falls upon the central disc *e*, the compass disc *K* will then point out continuously the magnetic course.

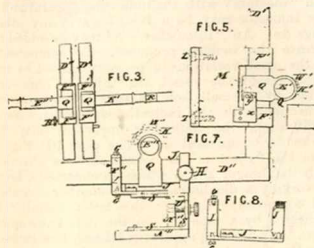
Abridged also in Class *Watches* &c.

1004. **Webster, F.**, [Webster, W.]. March 2.

Ships' logs, indicating fouling of. The tow line C of a ship's log is attached to the axis B of a "detector," shown in section in Fig. 2. Should the spindle B revolve, the cam D acts on the spring hammer E of a gong F, thus indicating that the body of the log and the line C are revolving instead of the vanes connected with the registering-apparatus.



1309. Nolan, J. P. March 17.



Telemeters.—Two instruments are placed one at each end of a bar and are called the "pointer" and the "reader." Each consists of a sighting telescope and a collimating telescope, the sighting telescopes being parallel. The "reader" has a glass scale, and when the cross hairs of the sighting telescope of the "pointer" are on the distant object, the part of the scale upon which the same object falls in the reader indicates the distance. On the said bars are three slide boxes into which fit tongues on the instruments; two of these slides are near together at one end, and the third at the other end of the bar. The short base is for adjusting the instruments, while the long base is used when taking the observations. The "pointer," Figs. 5 and 3, consists of two telescopes D^1 and E^1 fixed at right angles in a piece Q , D^1 for sighting and E^1 for collimating. The former, which is fitted with horizontally adjustable cross hairs, is supported in a tube F^1 in which it may slightly rotate. The tube F^1 is fixed to a block M to which is fixed a tongue by two adjusting screws L and T .

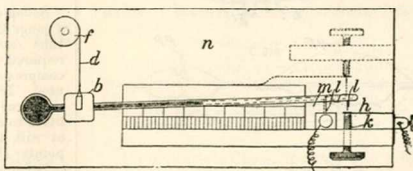
1385. Formby, J. March 22.

Thermometers.—Relates to a balanced thermometer for indicating, by electrical means, when a maximum or a minimum temperature has been reached. The thermometer is carried in a cork slide b suspended by two fine wires d from cork rollers f , which fit stiffly on a peg from the board n of the instrument. Round the end of the thermometer tube is wrapped a wire l which dips into a mercury cup m , and through which contact is made when a maximum temperature is reached by touching the spring h owing to the tilting of the thermometer. The spring h is coated with platinum and is adjusted by a screw k . The arrangement for the minimum point is shown in dotted lines. When it is desired to have the maximum and minimum indication separate, two separate wires l must be used, and also two mercury cups. Any sticking tending to prevent the breaking of the circuit is prevented by putting resistance in the circuit.

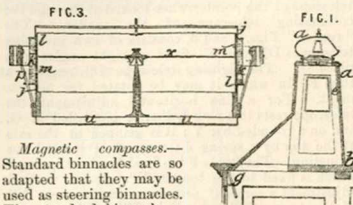
Abrided also in Class *Fire, Extinction* &c. of.

In front of the telescope E^1 is a sunshine, and on the eye cup is a prism R to bring the sky as a back ground to the cross wires of the collimating telescope of the pointer when looked at through the collimating telescope of the reader. The "reader," Figs. 7 and 3, consists of two inverting telescopes D^{11} and E^{11} fixed at right angles in a piece Q . The sighting telescope D^{11} rests in a tube F^{11} in which it may be rotated for adjustment. For a fine horizontal adjustment the telescope rests in a ring I , Fig. 8, gimballed at G , and on a rounded bar V ; it is gripped at the side at the top by a spring J ; a screw H is used for adjusting. The frame F^{11} is fixed to a bent spring S which is fixed to the tongue N^{11} . For a vertical adjustment a screw U presses against a piece N^{11} of the tongue N^{11} . A shade K^{11} , with counterpoise W^{11} , is fitted over the front of the telescope E^{11} . The telescope E^{11} has cross wires, and the telescope D^{11} has in focus a scale on glass &c. with an infinity line. In a modification, the two collimating telescopes are fixed parallel to the sighting telescopes, and have reflecting prisms over the object glasses. A rifle may be used as a base; a slide box for the pointer being on the stock, while the spring S embraces the muzzle end. For the short base a slide box is fixed near the muzzle. To adjust before taking a reading, the instruments are placed on the short base and the axes of the collimating telescopes are made to coincide; the axes of the sighting telescopes are then brought approximately parallel by moving the whole apparatus until the infinity line of the scale coincides with a very distant object; the cross hairs in the pointer are then made to coincide with the same object. To measure a distance the whole apparatus is turned until the cross hairs of the pointer coincide with the object whose distance is to be measured; the scale is then brought by the screw U , Fig. 7, over the same object, and its position on the scale indicates the distance.

FIG. 1.

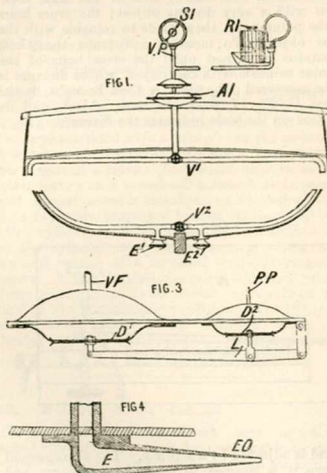


1416. Williams, W. R., and Williams, C. A. March 24.



Magnetic compasses.—Standard binnacles are so adapted that they may be used as steering binnacles. The standard binnacle *a*, Fig. 1, is fixed on a bridge deck *b*, and by means of a fixed mirror *e*, and an adjustable arc *g*, the steersman is able to see the compass card. The bowl *j*, Fig. 3, is surrounded by a coil of insulated wire *k* which is connected to a zinc ring *l* separated from the bowl by a sheet of paper *m*; this coil and ring diminish the oscillation of the needle. The bowl has india-rubber bearings and supports *p* and a glass bottom *u*, and the card *x* is of talc.

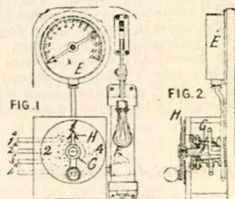
1443. Armstrong, J. March 25.



Logs and current meters.—Relates to apparatus in which the partial vacuum produced by an "ejector" is measured. At the keel of the ship is fitted an "ejector," or preferably one on each side of the keel, the nozzle of which is turned aft. Pipes

with three-way cocks *V*¹, *V*² connect either one or both "ejectors" with the indicating-apparatus *SI*. The indicator may be a Bourdon's or any other gauge &c. An "intensifier" *AI* may be added to increase the vacuum produced. To compensate for the small variations in pressure caused by the rolling &c. of the vessel, the "ejectors" are connected by a small hole to an air chamber in connection with the indicating-apparatus. As a modification, the indicating-apparatus may be worked by compressed air. The pipe *PP*, Fig. 3, from the "ejectors" is connected to a chamber with diaphragm *D*¹ to which is connected a lever *L* working a diaphragm *D*² of another chamber and compressing the air; this latter chamber is connected by a pipe *PP* to the indicating-apparatus. A registering apparatus *RI* may be attached. The Provisional Specification describes the registering-apparatus as consisting of a clockwork drum on which a style &c. or an electric needle is actuated, by electrical means, in proportion to the speed. In the Provisional Specification it is stated that an "ejector" is placed in the pipe &c. and the air and liquid drawn in by the vacuum work a turbine &c., which indicates with dials &c. the velocity of the liquid.

1641. Smales, J. M., and Rogers, H. J. April 5.



Sounding-apparatus.—The depth is indicated on a gauge *E*, by the pressure of air forced through a tube reaching the point at which the depth is required. The air is forced in by any kind of air compressor *f*, or chemically prepared gas, may be used. If the quantity in several reservoirs is to be measured as at 1st, 2nd, &c. a distributing-tap *G* is fitted to connect the gauge with any one reservoir at will, the connection being indicated by the pointer *H*. The instrument may also be used as a portable sounder, and the spring tube of the gauge may be fitted with a liquid that will accelerate its sinking, such liquid being retained by a diaphragm. Maximum or minimum pointers may be provided, and the apparatus may be made to graphically record the depths.

Abridged also in Class Registering &c.

1755. **Jensen, P.**, [Macgeorge, E. F.].
 April 13.

Gradients of bore-holes &c., determining.—In ascertaining the gradient of a bore-hole, a tube A, of copper or some non-magnetic substance, about eight or ten feet in length, is attached to the drill. Tubes of clear glass B, containing a hot solution of gelatine or melted wax or similar substance, are accurately fitted into the copper tube. The spaces between the phials, each about nine inches, are filled with hot water or oil, or any slowly cooling substance. A card C marked with the points of the compass and provided with a needle, floats on the surface of the fluid. After the apparatus has cooled down and the fluid in B solidified, one of the phials is removed and placed in such a position on a level surface, that the needle points north and the float is level; the inclination of the phial will then give the angle and the magnetic bearing of the gradient. From these data the form of the bore-hole may be plotted out as shown in Fig. 2.

Abridged also in Class *Mining &c.*

1782. **Grütter, G.** April 14.

[Provisional protection only.]

Clinometers.—A spirit lever is attached to a graduated disc, the centre of which is pivoted to a second disc formed with a straight edge or base-plate. The inclination is shown by means of a flat spring which engages with teeth on the margin of the graduated disc.

1814. **Groth, L. A.**, [Nilsson, J.]. April 17.

[Provisional protection only.]

Sounding-apparatus.—At the bow of the ship are attached two arms connected at an angle, and movable round a tap in a bracelet on the ship. The longer arm, when placed vertically, reaches about eight feet deeper than the ship's stern. A rod moving through a lap at the end of the shorter arm passes along guide brackets on the ship's bow, and is toothed at its upper end. In shallow water the longer arm touches the ground and is pushed back, pulling downwards the above rod whose teeth operate a bell hammer and close an electric circuit which operates a bell in the engine room.

1937. **Abel, C. D.**, [Richter & Co., E. O.].
 April 24.

[Provisional protection only.]

Drawing-pens.—Two tapering prongs, with a tapering slot between them, are cut longitudinally in the end of a steel tube. The prongs are then bent together so as to meet at their points, and after being ground and tempered, are provided with a screw and nut to adjust the distance between them. Or the prongs may be stamped out of a steel plate, and the plate then bent into tubular form and finished as before.

1967. **Haddan, H. J.**, [Kappeller, H.].
 April 26.



Thermometers, maximum and minimum. A vertical glass tube is provided at top and bottom with bulbs, and filled with alcohol to about the middle of the upper bulb *e*. The continuity of the spirit column is broken for about five or six degrees by a short thread of mercury *a, b*, which serves as an indicator of the temperature. Two steel indices fixed into small glass tubestand placed one, *c*, above, the other, *d*, below the mercury, indicate the maximum and minimum temperature. The scales read in the same direction, but differ from each other by the length of the mercury thread *a, b*.

1980. **Townsend, C.** April 26.

[Provisional protection only.]

Thermometers which have the scale engraved on the tube have also etched thereon in a convenient position the error found on comparing the readings with those of a standard instrument. This replaces the usual certificate which contains the corrections.

2119. **Boult, A. J.**, [Chapentier-Page, G.].
 May 5.

[Provisional protection only.]

Magnetic compasses &c.—Various apparatus (as a spring-tape measure, compass, level, stop watch, or speed measurer) may be combined with a circular slide rule, being mounted either between the faces of the dials or on the reverse side of the slide rule.

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

2163. **Sauvée, A.**, [Anagat, E. H.]. May 9.

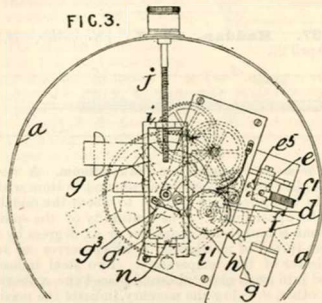
[Provisional protection only.]

Pyrometer.—Consists of a metal tube, preferably spiral, the two ends of which are continued vertically and open into separate chambers. Each chamber is provided with a thermometer and communicates with a pipe by which a current of water or other liquid is maintained. The whole is

enclosed in a case, with apertures for reading the thermometers. The lower end of the apparatus is brought in contact with a source of heat and the temperature of the current taken both before and after circulation, the constant speed of the current being known; from these data a table of temperatures may be prepared. If preferable, a scale is constructed which may be set according to the speed of the current and the temperature read at a glance.

2180. **Lilley, G. C.** May 9.

FIG. 3.



Ships' logs and tide-speed indicators.—A screw is attached by a flexible cord e^b and universal joint e^c to the shaft e of the indicating mechanism. The shaft e , by means of the worm gearing e^b and f^1 , Fig. 3, actuates a cam or inclined face-plate f , which actuates the counting mechanism through an adjustable lever g working on the first motion shaft d , and the pawl and ratchet gear g^1 , h . Adjustment is effected by a slide i which can be moved by the screw j from the outside. The part g^2 of the lever g rests upon the slide i at i^1 when in its lowest position, as shown in dotted lines, Fig. 3. Thus the stop i^1 limits the movement of the lever, and as it is lowered or raised it allows the lever to come sooner or later in contact with the face-plate f . The button n indicates on a scale the position of the adjustable stop. A dial and index is provided in front of the case a . The regulation may be obtained with a fixed stop, by making the cam adjustable with regard to the lever. Instead of a cam or face-plate, an eccentric may be used to act on the lever g , and in this case the regulation would be made by altering the throw of the eccentric, or by adjusting the case containing the mechanism with regard to the shaft about which the eccentric rotates.

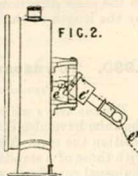
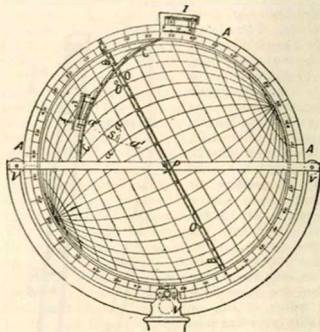


FIG. 2.

2457. **Justice, P. M.**, [Oginaga, J. J.],
May 24.



Determining position of vessels at sea.—An adjustable globe is provided with graduated bars serving as meridian A, A , equator B, B , and quadrant C, C , together with the requisite verniers. Two observations of heavenly bodies are made in different verticals, preferably with an azimuthal difference of 90° ; these are used in tracing arcs $aa a^1$, of "parallels of illumination." The centres of these arcs are the geographical points, which at the moment of observation have the observed bodies in the zenith, the radii are the zenith distances of the celestial bodies, and the intersection of the arcs the geographical position of the vessel required. The arcs are traced by a pencil fixed at the zero point of the vernier 3. The equatorial rack O, O is provided with a micro-meter screw P , which may be easily connected and disconnected. v, v, v are the tangent points on which the globe rests. When the sphere has been brought to its required position and fixed, the longitude of the pole of one of the altitudes taken is made to coincide with the meridian A, A . The pencil secured in the altitude vernier traces out one of the arcs. By repeating this operation for the other altitude taken, a second arc is obtained intersecting at the geographical position of the ship. The sphere may be employed for the graphical determination of latitudes and longitudes.

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

2490. **Green, H.** May 25.

[Provisional protection only.]

Squares.—A jointed rule has one of its arms capable of being folded over on itself to form the stock of a square. The joint connecting the two arms may be fitted with a small spring edge bolt engaging to hold the arms at the required angle. The face of the joint is graduated in degrees.

Abridged also in Class *Registering &c.*

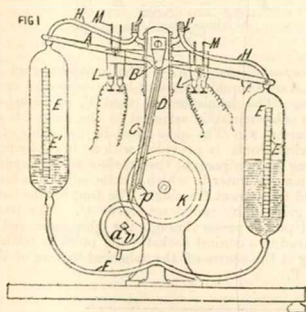
2780. Morgan, W. T., and Kidd, R. L.
 June 13.

[Provisional protection only.]

Magic-lantern slides.—The pictures are printed &c. on concave films which are transferred to curved glasses, to improve the definition at the edges of the enlarged picture.

Abridged also in *Classes Buildings &c.; Ornamenting; Photography; Printing other than letter-press &c.; Toys &c.*

2786. Clark, A. M., [Bourdon, E].
 June 13.



Air pressure, indicating and recording.—Two cylindrical glass vessels E, E are hung on centres at the ends of a balance beam A, A. Each vessel is provided with a scale E', E' for reading off the level of the contained liquid, and is connected with the other by a flexible tube F attached to the lower ends. The upper end of each is provided with a tube H, H furnished with connections I, I', leading to the inlet and outlet of an anemometer. The rigid rod C is fixed to the beam just below the centre of oscillation and to its extremity is attached a weight which is adjustable, according to the degree of sensibility required, by a set-screw *v*. The flexible arm D carries a stylus *p* which records the variations of pressure on a plate K rotated by clockwork. Small glass cups L, L, fixed adjustably to the standard, contain mercury and are provided at their lower ends with copper terminals for connecting with electric bells. M, M are two pairs of bent wires which are attached to the beam and dip into the mercury on undue inclination of the beam, making contact and sounding the corresponding bell. The bells in the separate circuits are of different pitch and indicate whether the higher or lower degree of pressure has been reached.

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

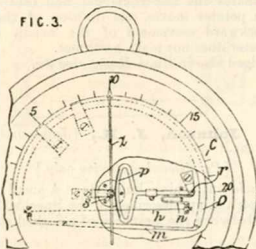
2840. Shaw, H. S. H. June 16.
 to Specification.

Logs, anemometers, &c.—The Provisional Specification describes a speed indicator, applicable to logs, anemometers, &c., comprising a disc worked by a clock and pressed against a roller, which is mounted on the axis of the screw rotator. The roller moves along the screw until its angular velocity becomes equal to that of the screw, thus showing by its position the speed. An attachment may be made to record the speed on a band of paper or a dial, and several rollers may be used with one disc.

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

2856. Engel, F. H. F., [Klinkerfues, W].
 June 16.

FIG. 3.



Hygrometer and dew-point indicator.—Improvements on the instrument described in Specification No. 2078, A. D. 1881. A hair *h* is attached to the movable end of a Bourdon thermometer ring D. The other end of the hair is connected with the arm *n* of a segment lever *p*, pivoted at *r*, which gears with a pinion *s*, to the axle of which the index *z* is fastened. C is a fixed graduated scale on which the dew point is directly indicated. By pushing in an external button a spring key engages with the teeth of the pinion *s* and stops any movement during transport. In a modification the index is directly actuated by the alteration in length of the hair. The indications are made on an outer fixed scale and an inner concentric movable scale. The former is divided with respect to the hygroscopic qualities of human hair, the shortening from the point of saturation being proportional to the decrease of the logarithm of the relative moisture. The inner scale is divided in degrees of the logarithm of the tensions of vapour at the different temperatures of the air.

2877. Lake, W. R., [Nordeck, L. G. C. de].
 June 17.

[Provisional protection only.]

Sounding-apparatus.—The part of the apparatus thrown overboard consists of a pressure gauge whose needle is in electrical connection with the

sea. As the needle moves it comes successively into contact with metal pins on a plate in connection with the sounding line. This part of the instrument is weighted and placed in a watertight case (except for the orifice for communicating the pressure); its upper part has a thin pointed form and is pierced by holes in such a manner that the passage of the instrument through the water will not effect the manometer. The cable consists of a metal core surrounded by insulating material, and is wound on a reel on deck. The indicating instrument on deck is in electrical connection, through the core of the cable, with the before-mentioned metallic pins. It consists of one or two pointers moving over a scale, which are actuated by clockwork having an anchor escapement, one of whose arms carries the armature of an electromagnet. Each time the manometer needle comes in contact with one of the metal pins, a current passes through the cable and the sea water, and actuates the electromagnet and escapement, and the pointer moves one division of the scale. The backward movement of the needle of the manometer does not make a contact.

Abridged also in *Class Registering &c.*

2909. Johnson, J. H., [*Jeansaume, A.*].
June 20.

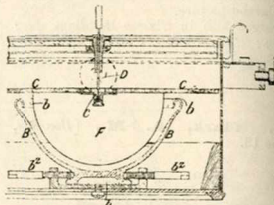
[*Provisional protection only.*]

Spectacles, attaching lamps to. A small candle, oil, or spirit lamp, described in the Specification, is pivoted between the branches of a forked support,

the other end of which engages by hooks upon it with the spectacle wires.

Abridged also in *Class Lamps &c.*

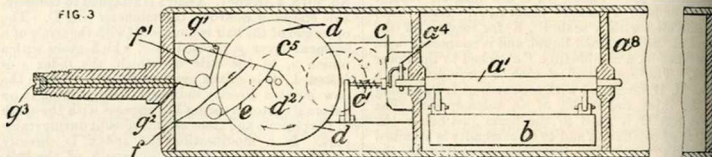
3061. Betbeder, F., [*Bourse, E.*]. June 28.



Compasses, magnetic.—The compass card is floated on a liquid instead of being supported upon a pin. The hemispherical float F, of nickel or some other metal, is attached to the underside of the card C, C. The glass bowl B, preferably of a spherical form, is provided with an inwardly-projecting lip b to prevent the overflow of the liquid; this may be water to which a little spirit has been added to prevent freezing. The foot of the bowl b is gripped by radial set-screws b'. The ivory pivot pin D passes through the glass cover and is received in a conical socket c, the point of contact being at the centre of the spherical surface of the float F.

3128. Lowne, R. M. July 3.

FIG. 3



Ships' logs; current meters.—After a certain number of revolutions of the rotator the mechanism makes contact in an electric circuit between the rotator and recording-apparatus. The spindle of the hollow watertight rotator a rotates in a frame which is fitted with friction rollers pivoted on a loose collar. Inside the rotator is a pendulum weight b which remains vertical as the rotator revolves. This works, through pins a', c, a worm and train of wheels c' to c⁵. On the last wheel c⁵ is a pin which comes against a pin on a flywheel d and so turns it. On the other side of this flywheel is a secured pin d², which acts on a spring e; after a certain portion of a revolution this spring reacts on the pin and causes the flywheel to revolve independently of the wheelwork. During this part of the revolution of the flywheel the pin d² acts on a lever f and so causes contact to be made between the points f' and g'. By this arrangement the contact is made of longer duration. The point f' is in metallic connection with the rotator, and so through the coupling hook with a wire in the towing cable, which is connected to the zinc pole of the battery. The point g' is insulated from the rotator and is connected by a platinum wire g² to a platinum cup g³ in electrical connection with a second wire in the cable by a wire and a platinum peg which is pressed into the cup by a spring. At the back of the rotator is an air chamber a⁸ which causes the apparatus to dive under water. The apparatus may also be used as a current meter.



- 3209. Clay, C.** July 6. *Drawings to Specification.*
[Provisional protection only.]

Thermometers for testing the temperature of hay stacks &c. are placed in a metal pointed tube provided with sight holes for reading the scale.

Abridged also in Classes *Agricultural appliances, Farmyard &c.; Air and gases, Compressing &c.; Cooling &c.; Drying; Pipes &c.*

- 3232. Plucker, J. F.** July 7. *Drawings to Specification.*

Tripod stands.—The legs are made of brass or similar tubing, each in several pieces sliding one within the other. The lower end of each section, except the innermost one, is split and has a collar that may be tightened by a screw to retain the screw within. The feet have ears that serve to draw out the tubes. Each leg is pivoted to the top of the stand. The screw to which the camera is fixed projects upward from an inverted cup, which moves on a ball and is kept in position by a hook and eye that may be tightened when necessary; this allows the camera to be tilted in any direction.

Abridged also in Class *Photography.*

- 3450. Ber, O.** July 20.

[Provisional protection only.]

Direction of wind, recording and indicating.—A vertical shaft provided with a vane, gears with a disc, carrying a dial of paper divided into concentric parts, each part corresponding to one hour. On the dial are also marked the points of the compass. To the centre arbor of a clock a toothed wheel is attached, which gears with a vertical hinged rack, carrying a pencil. As the vane follows the wind, the dial attached to the shaft turns and a record is made thereon by the pencil which rises as the clock advances. The direction may be indicated by a cylinder connected with the shaft and marked with the points of the compass. The marks appear opposite perforations in an outer case as the cylinder revolves.

- 3457. Boulton, A. J.,** [Wenzel, J.]. July 20.

[Provisional protection only.]

Telescopes.—Relates to a method of mounting a telescope for recording the positions of distant points for future reference or for indicating what points are in the field of view. On the lower part of an upright cylinder, on an adjustable stand, is a rotatable hoop, on which is a knob for turning it, and opposite to the knob is a pin carrying a graduated segment and a telescope free to rotate in a vertical plane. An index marks the position of the telescope with reference to the segment while the segment serves as an index for indicating the position of the hoop on the cylinder. These

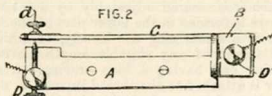
two readings may be marked on a paper round the upper part of the cylinder. In a modification the telescope may be either mounted on the top or at the side of the cylinder. When mounted on the top of the cylinder the telescope may carry a hinged arm with a projecting point which fits into holes which serve instead of scales.

- 3646. Redfern, G. F.,** [Wart, H.].
Aug. 1. *Drawings to Specification.*

Hygrosopes.—The presence of moisture in an apparatus for destructive distillation may be detected by inserting into it glass tubes dusted internally with chloride of calcium.

Abridged also in Classes *Acids &c., Dirs. II. and III.; Gas manufacture; Metals and alloys.*

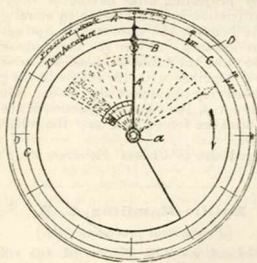
- 4073. Justice, P. M.,** [Vankeerberghen, V.].
Aug. 25.



Alarm thermometers.—Reference is made to Specification No. 3791, A.D. 1882. A wooden, metal, or other plate A carries a copper plate B supporting a fixed strip C of metals of different expansive powers. The electric connections are made at screws D, D', the former of which is an adjustable screw with an ordinary locking-screw. The curving of the plate C by the action of heat makes electric connection and sounds a bell.

Abridged also in Classes *Bells &c.; Buildings &c.; Electricity &c., Div. III.; Fire, Extinction &c. of; Registering &c.; Signalling &c.*

- 4302. Plunkett, J. W.** Sept. 9.



Specific gravity, estimating; thermometers.—A pressure gauge and a thermometer are combined in such a manner as to form an apparatus for indicating and recording the amount of salt in the



water of steam boilers, or the density of other solutions boiling under pressure. The apparatus is based on the fact that a saline solution and pure water require to be heated to a different temperature to attain a given pressure. It consists of graduated scales C, D, over which two needles move, the one A mounted on a tubular shaft a and the other B on a shaft within the former, respectively connected to a pressure gauge and to a thermometer or pyrometer. The scale is so constructed that for pure water the needles will coincide and will deviate more and more from coincidence as the density of the solution increases.

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

4324. Groth, L. A., [*Eymannberger, J., and Menn, M.*]. Sept. 12.

[*Provisional protection only.*]

Pantograph for enlarging and reducing maps. A pen or pencil is passed through a hollow handle in which it is secured adjustably by a set screw. A groove is formed in the lower part of the holder and in it a metal ring fits loosely, to which an elastic thread of any suitable length is attached, the other end having a loop or ring. A metal pointer is attached to the thread in such a way as to be adjusted to any desired point thereon. The loop or ring is fastened to a fixed point and the pencil held in the hand, the cord being stretched to a varying degree according to the enlargement required. The operator then moves the pencil point over the surface of the plain paper in such a direction as to cause the small pointer to follow the lines of the drawing to be copied.

4564. Unger, J. Sept. 25.

[*Provisional protection only.*]

Tripod stands for tables, studio cameras, &c. The head of the supporting pedestal has a cap carrying ears for hinged pins and quadrant guides. In the ears are hinged the butts of three or more upwardly projecting arms having at their upper ends antifriction rollers bearing in spiral grooves in a plate beneath the camera &c. Springs force the arms inwards. When the elevating-screw is turned to raise the table &c. head, the arms come somewhat together with the rollers in the groove, the arms serving to support the head. When the head is lowered, the supporting action is the same, but the arms are forced back and the rollers leave the groove.

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

4642. Baillie-Hamilton, C. R. Sept. 29.

[*Provisional protection only.*]

Parallel rulers.—The blades of the ruler are fitted with two hinged links with arms of equal length, the outer extremities pivoted to the blades, the inner pivoted to a slotted central link bar. Between the two links a third is provided, whose length is regulated by the length of the blades. The outer extremities of the middle link are

pivoted to the outer extremities of one of the side links, and the inner ends are fastened together by a suitable pin which moves in the slot formed in the link bar. The inner sides of the blades are recessed to admit the link bar when the ruler is closed.

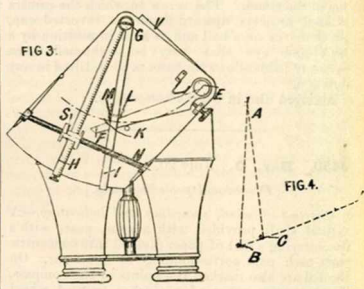
4648. Callendar, H. L. Sept. 30.

[*Provisional protection only.*]

Ruling pens, reservoir.—A piece of glass tubing is drawn out in a flame to a capillary point, and the end is broken off and smoothed by fusion. An opening at the opposite end admits air to the tube. The tube is contracted by fusion a short distance above the point to confine the ink to the lower part of the reservoir and regulate the flow of ink.

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

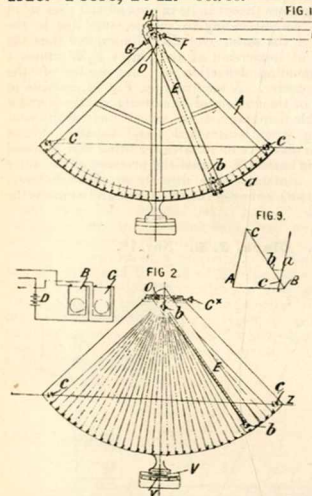
4871. Bate, C. M. Oct. 13.



Range-finders.—To a base-plate a binocular field glass or telescope is fixed by a screw so that its position may be altered if desired. A vertical mirror V half the depth of the object glass is attached to the base plate by the axis E, to which is fixed the arm EF. The two bars GH and GI are pivoted at G; GI has a knife-edge projection at K capable of minute longitudinal adjustment, so that the distance GK can be made equal to GE. The knife edge K and the centre E are on the circumference of a circle with centre at G. The gauge bar N being in a constant position, the arm places itself at an angle to the gauge equal to the angle which the object seen in the mirror makes with the line of sight. The loose graduated bar GH is used to mark the first position of the arm when the first angle is taken. The accurate adjustment of the length GK to equal GE is made by the spring M, fixed to GI, which is adjusted by the screw L. The gauge S is a small piece of hard steel in the form of a letter H, sliding on the bar N. In use, the direct object I and the reflected image A are made to coincide and the bar H clamped so that the angle ABI is equal to the angle made by the central line of S with H. The observer moves over a known distance towards I and makes a second observation at C; the angle ACI will equal the angle made by the central line

on S with the bar GI; the difference between these angles will equal the angle BAC, or the separation of the two bars GH and GI. The indicating-gauge is made to slide as far as possible towards G and its position read off on the graduated edge, which will give the distance of the object required or a distance of which the distance required is a definite multiple.

4926. Poore, F. H. Oct. 16.



Range-finders.—An imaginary triangle ABC , Fig. 9, is constructed on a base AB of known length, the object whose range is required being at the apex C . A second triangle abc is constructed similar to the first, having its base ab a determined proportion of AB . Hence $bc : BC = ab : AB$; as ab is known and bc can be measured, BC can be calculated. At the extremities of the base AB , the instruments shown in Figs. 1 and 2 are situated. To the arc of the indicating-sector, Fig. 1, is attached a metal band a perforated in such a manner that, when the line of sight corresponds with one of the radiating lines, a projection on one of the two contact levers on the sight-bar falls into a perforation and puts one of the signal bells B or C in circuit with the battery D . The sight-bar E rotates about the axis O at the centre of the sector A ; the terminal screws F, G, H serve to connect the signal bells B, C and the battery D with the contact pieces and the head carrying the contact levers at the end of the sight-bar. b, b and c, c are sight vanes on the sight-bar and sector frame A respectively. In Fig. 2 the radiating lines divide the sector similarly to those in Fig. 1. The sight-bar E , with sight-vanes b, b , rotates about the axis O , which is not the centre of the sector,

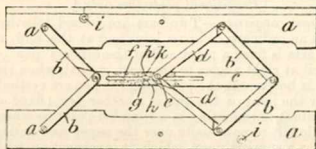
but is capable of adjustment in a direction parallel to the base line YZ by means of an adjusting-screw C' acting on a block carrying the axis O ; the bearing is graduated and a fiducial mark on the block indicates the position. The lines of the instruments are set parallel by means of the sights c, c on the framing. If the object be fixed, the sight-bar of the indicating instrument, Fig. 1, is placed at the nearest point of electrical contact, and the sector is rotated until the sights are aligned on the object, the angle being measured by the vernier V ; the second instrument, Fig. 2, is then rotated through the same angle. In this case a slight correction is required, as the short base is not parallel to the longer.

4976. Melsheimer, R. E. Oct. 19.

[Provisional protection only.]

Compasses, ships.—The bowl of the binnacle revolves on a pivot about a central vertical axis; the pivot is provided with a short arm to which a rope is attached and towed astern. The deflection of the lubber line will indicate the ship's course corrected for leeway. The arm may be fixed or self-adjusting. A fine wire is attached to the binnacle and bent inside the bowl, constituting a fixed lubber line.

5039. Baillie-Hamilton, C. R. Oct. 23.



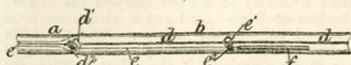
Parallel rulers.—The blades a, a of the ruler are fitted with two hinged links b, b , having arms of equal length; the outer extremities are pivoted to the blades at points equidistant from their inner edges, the inner extremities to a slotted central link bar c . Between these two links a third d is provided, whose length is regulated by the length of the blades. The outer extremities of the link d are pivoted to the outer extremities of the side links, and the inner ends forming the hinge are fastened together by a small pin or stud e which moves in the slot f formed in the link bar. The small rod g attached to the stud e is provided with pointers h, h , to indicate on the scale the distance traversed by the preceding blade. This is applicable to any suitably-constructed parallel ruler as an automatic indicator. The perforations i, i are for setting-off lines at right angles to those ruled. The inner margins of the blades are recessed to admit the link bar when the ruler is closed.

5107. Goolden, W. T., and Casella, C. F.

Oct. 27.

Alarm thermometers.—Relates to means for adjusting the limits of temperature. A wire is connected electrically to the mercury at the bulb or the bend of the tube. In elongations b of the tubes a are fixed wires d , on which slide eyes e'

with two or three loose links, which project into the tubes *a*, and the wire *e* slides in an eye *d'*, with two or three loose links, on the wire *d*. The



position of these wires *e* can be varied by the action of a magnet on a piece of steel *f*. The Provisional Specification states that a needle on a dial may be in the circuit, and a band moved by clockwork may note the time at which the transmitter exceeds the limits.

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

5271. Wetter, J., [*Wachs, A.*] Nov. 4.

[*Provisional protection only.*]

Parallel rulers.—A rule, furnished with a handle, is mounted upon a pair of parallel rollers fixed to a horizontal shaft. One roller actuates a toothed ring whose motion is shown by a dial and pointer when the rule is moved over the paper. An auxiliary roller is attached to the centre of the rule and provided with a cross handle. A set pin allows the pointer to be regulated.

Abridged also in Class *Registering &c.*

5345. Brookes, J. Nov. 9.

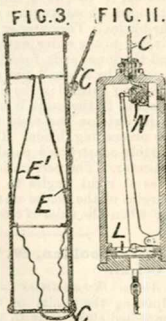
[*Provisional protection only.*]

Beam compasses.—Two bars are joined together with an ordinary compass joint and at the end of one arm is fixed a point and at the other a pen or pencil at right angles to the arm, so that, when the arm is horizontal, the point and the pen are vertical. Near the joint of the arm is another leg (fixed or movable), terminating in a rounded point or wheel to allow it to pass easily over the paper and acting also as a support upon which, in conjunction with the other two arms, the instrument may be left standing in position.

5459. Mackenzie, W. J. Nov. 16.

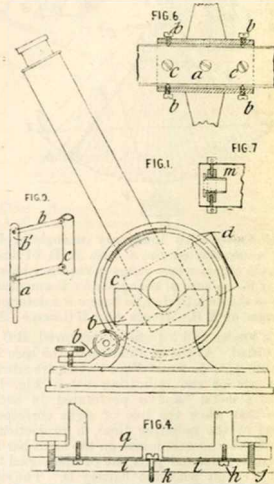
Sounding-apparatus.

—Relates to apparatus of the pressure gauge type, and consists in methods of recording the variations of a current of electricity transmitted through a sounding vessel, such variation representing the depth of the soundings. In one form the sounder, Fig. 3, is of metal lined with some non-conductor, and contains two plates or rods *E*, *E'* placed symmetrically. Their upper ends are held apart by a slotted bar in a ring of vulcanite and the two plates are



connected to two separate insulated wires which pass out through the casing to the cable *C* which is wound around a drum on board the vessel. The two wires are led to a battery having in circuit a galvanometer which is deflected to a degree depending on the electromotive force of the current, and the resistance of the current. A lead weight is attached to the cylinder. The water enters the bottom of the cylinder and immerses the plates *E*, *E'*, thus completing the electric circuit, and consequently the galvanometer needle is deflected. As the cylinder sinks, the water entering it compresses the air in its upper end and rises to an extent corresponding to the pressure due to the depth of the water over the cylinder, and thus the degree of immersion of the plates *E*, *E'* causes a corresponding deflection of the needle of the galvanometer. A modification, Fig. 11, consists in fitting in the bottom of the casing of the sounder a flexible diaphragm *L*, to which one of the conducting wires is attached; and between it and another plate in contact with the other wire is placed a carbon button *N*, so that the pressure of the water makes contact, either directly or through levers (as shown), between the two wires, and connects the circuit.

5485. Clark, J. L. Nov. 18.



Transit instruments.—Fig. 1 shows a reflection instrument with a mirror in the angle between the two limbs. A vernier plate *c* is fixed on the main axis of the instrument and registers against a fixed declination circle *d*. The instrument is adjusted by means of an arm *b* fitted with a screw stop. This form of instrument is especially suited for window observations. In instruments

of the ordinary type the regulating-arm is adjusted by means of a screw working in a support on the base, and is fitted with a clamping piece engaging the declination circle. The frame is secured to the solid base so as to allow full play for the levelling screws. A flat metal spring *i*, Fig. 4, is screwed to the underside of the instrument and a single screw passes through the centre and enters the solid base. To render the support steadier, five levelling-screws are used; the three usual ones for a first adjustment and two additional ones which are afterwards brought to a bearing. To adjust the cross-wires without using the usual straining-screws, the tube of the telescope passes loosely through the trunnion of the instrument as shown in Fig. 6, and is supported within the collar of the axis by screws. In place of the above arrangement the cross hairs may be placed on a plate attached to the end of a short tube, as shown at *m*, Fig. 7, and this tube is screwed through the centre of the disc which usually carries the hairs. The focal distance and the direction of the hairs can be thus altered by the adjustment of the tube. The illumination of the cross hairs is effected by a lantern shining through a hole in the trunnion of the telescope with a reflector in the interior. This reflector preferably consists of a whitened disc hinged on to a cap fitting on the end of the instrument and having a small hole in its centre for observations. To support the lamp a stem is inserted in the base of the instrument carrying two pairs of parallel jointed arms, Fig. 9, which bear the lamp socket. Clamping-screws are used for the regulation of the arms.

Abridged also in Class *Lamps &c.*

5558. **Osborn, A.** Nov. 2.

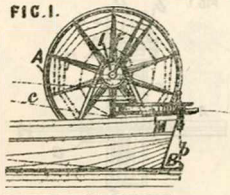


Ruling pens, reservoir.—Passing through the reservoir *a* is a pin or piston *b* carrying valves *c* and *h*, which regulate the supply of ink and air to the pen. The valves are normally held closed by the springs *d* and *i*, which are enclosed in dry chambers to which ink is prevented from passing by the diaphragms *l, l*. The spring *d* surrounds the ink tube *e*. The pen *g* is carried on a sliding tube *c* which is connected with the ink feeder *f*. Pressure upon the pen in ruling simultaneously opens the ink and air valves, and allows the ink to flow to the nib. Air is admitted through an aperture in the cap *k*. The lower spring may be dispensed with, and the valves be opened by slightly raising a cap piece at the top of the reservoir. The pin *b* is in this case made in two parts connected together in the centre of the reservoir by two tubes and a coiled spring, which latter is enclosed in an india-rubber tube.

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

5566. **Sutcliffe, F.** Nov. 25.

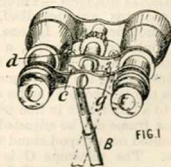
FIG. 1.



Sounding-apparatus.—A drum *A* fixed at the end of a boat, carries the line *b* and lead *B*. A line *c* is wound on a spiral wheel attached to the side of the wheel *A*, and, passing through a block at the front of the boat, returns to the weight *B*, thus preventing it from trailing astern. To the bearings of the wheel *A* are attached two pointers, one of which *F* indicates measurements upon the wheel *A*, and the other marks readings on an adjustable disc *I*. By this means soundings may be reduced to any datum level at sight on the rim of the wheel *A*. A spring is fitted to counteract the paying-off motion of the wheel, and pick up slack in the lines *b, c*. When taking soundings in confined situations means are provided for noting the distance between the site of the different soundings. A line passes from a drum *M* over the stern of the boat, and its end is attached to some fixed object. By noting the revolutions of the drum as the wire is paid out, the distance travelled can be ascertained. A modified arrangement with two drums, one of which takes in while the other pays out, is described. A registering-apparatus can be fitted to plot soundings as they are taken, in which case a pointer carrying a pencil is arranged in relation to a rotating drum carrying a roll of paper, so that any rise or fall in the lead causes a corresponding longitudinal movement of the marker upon the paper. The registering-drum may be actuated by the distance measuring apparatus or by suitable clockwork mechanism.

5564. **Boult, A. J.**, [Mack, W.]. Nov. 28.

Opera glasses.—Consists in the application of a holder *B* furnished with a spring hook *d* which grips one side of the bar *g*, whilst the other is clutched by the notch *c*. The holder may be telescopic, or it may be arranged to fold up and be inserted in the opera glass case, and it may be applied to a parasol or cane handle.



Abridged also in Class *Umbrellas &c.*

211. **Greening, E. O., and Barker, E. D.** Jan. 13.

[Provisional protection not allowed.]

Thermometer to indicate the temperature of hay or corn stacks. The tube is marked with words to indicate when and how a cooling apparatus is to be employed, and when danger would arise from overheating.

Abridged also in Classes *Agricultural appliances, Farmyard &c.; Air and gases, Compressing &c.; Cooling &c.; Fire, Extinction &c. of.*

253. **Rudd, R. I.** Jan. 16.

[Provisional protection only.]

Diagram recorders for gauges for water, wind, rain, tides, and other like purposes. A registering drum on a vertical axis has imparted to it a longitudinal as well as a rotary movement, so that a continuous spiral diagram is obtained. The vertical movement is obtained by causing the drum to travel by gravity down a fixed screw, its movement being regulated by clockwork.

Abridged also in Class *Registering &c.*

260. **Justice, P. M.,** [Birch, J. S.]. Jan. 16.

Drawings to Specification.

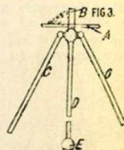
Sounding-apparatus.—The invention is described in connection with a vessel having a centre-board which slides up and down in inclined ways or slots. The after end of the centre-board is fitted with a rack &c., which causes a bell to ring when the centre-board is lifted by touching the ground or shoals.

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

393. **Beer, A. I.** Jan. 24.

Photometer.—Consists of a disc A with an indicator B supported on the tripod C and fitted with the pendulum D and weight E. The weighted rod works in a socket joint and ensures the constant level of the plate A on which the shadows from the indicator B are read off.

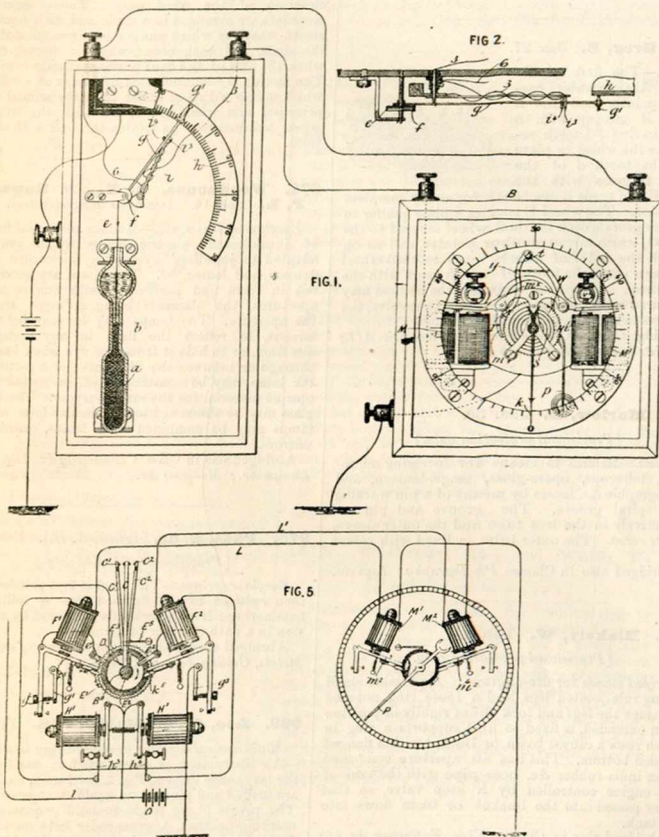
Abridged also in Class *Photography.*



454. **Thompson, W. P.,** [Hewett, R., and Clarke, C. L.]. Jan. 27.

Barometers, thermometers, &c., indicating variations of, at a distance. In one arrangement, Fig. 1, change of volume of mercury in a vessel *a* having dilute sulphuric acid in the upper part, acts through a float *b* and a cord *e*, to turn a pulley *f* so that a pointer *g* moves over an insulated metal arc *h*, with which a roller *g'* on the pointer makes contact. The graduations are formed of insulating material, so that as the pointer moves it alternately makes and breaks contact with the arc. The pointer normally lies between two pins *3, 6*, carried by a weighted pivoted arm *i*, and respectively connected to wires 3, 6. Movement of the pointer, however, connects it with one of the pins, so that the circuit, including the distant-indicating apparatus B, is completed. When the mercury expands, an electromagnet M in the receiver is excited and attracts its armature *m'*, so that a pallet *m²* on a lever *m³* connected with it descends ready for engagement with a tooth of a wheel W having as many teeth as there are graduations on the arc *h*. A pin *y* on the lever also raises an arm *t*, so that a pallet *r* releases the wheel, and a downward extension of the lever releases a spring pawl *p* from the wheel. When the current ceases, from the passage of the wheel *g'* over an insulated part of the arc *h*, a spring *s* turns the wheel until stopped by the pallet *m²*. The wheel is thus turned one tooth and a pointer *k* moved one division over a dial for each passage of the pointer *g* over a graduation on the arc *h*. When the mercury contracts, the reverse movement of the pointer energizes a magnet M' which moves the pointer *k* backwards. Here, however, the movement of the armature acts through the arm *t* and pallet *r* to move the wheel against the action of the spring *s*. In a modification, Fig. 5, change of temperature is caused to turn an arbor B', so that a pointer moves over a dial by the action of two curved bi-metallic strips, each fixed at one end and having at the other a pin working in a slot in a double-armed pivoted lever having a sector geared with a pinion on the arbor B'. The pins on the two strips work in the slots in the opposite arms of the lever so that their movements act together to turn the arbor. An insulated arm C on the arbor has an annular lug, against which bears a contact brush D connected by a wire 1 with the battery O. Two arms C', C'' mounted on insulated sleeves on the arbor are connected by contact brushes *e', e''*, and the connections shown, with relay magnets H', H'' connected with the battery. Movement of the arbor B' by the bi-metallic strips connects a pin *c* on the arm C with either the pin *c'* or *c''* and completes a circuit, so that one of the magnets H', H'' attracts its armature. These magnets, which operate similarly, act respectively for rise and fall of temperature. Considering the action of the former, its armature makes contact with a light spring *h³* having an adjustable rubber buffer behind, so that an electromagnet F³ is put in the circuit. This then attracts its armature F³, an insulated spring pawl on which then slides up a toothed wheel E'. The movement of the armature swings a hanging contact *g'*, through which the circuit was completed, sufficiently to momentarily break contact, so that the magnets H', F³ are demagnetized, and the parts return to the position shown. The pawl on the armature F³ then turns the wheel E' a certain distance (preferably one tooth), so that the arms C', C'' are moved correspondingly to the arm C, and contact between the pins *c', c''* is broken. The movement of the arbor B' is thus a step by step motion as described regarding Fig. 1. A light dog E² engaging a toothed wheel E² prevents accidental movement of the arbor. The action for fall of temperature is similar but reversed, the pawl *h²* operated by the magnet F², acting on a

ratchet-wheel E^2 . Each time the circuit is completed, one or other of two electromagnets M^1, M^2 , the distant indicator attracts an armature and moves a pointer P over one division of a dial, as described regarding the magnet F^1 . In a modification, the contacts g^1, g^2 are respectively connected with the main wires L, L^1 ; the brushes e^1, e^2 are connected directly to the relays H^1, H^2 , and the magnets F^1, F^2



are connected to their armature levers. Or the hanging contacts g^1, g^2 may be applied to the armature levers m^2, m^1 . The arrangement described regarding Fig. 5 may be modified to work with a single main line conductor. Two batteries are preferably employed, one pole of each being connected to earth and the others connected with two contact brushes replacing the brush D and making contact with insulated lugs connected electrically with the two pins c on the arm C , which pins are insulated from each other. The magnets H^1, H^2 are replaced by a polarized relay whose armature oscillates between the spring contacts h^2, h^1 with one or other of which it makes contact according to the direction of the current. In the receiving instrument, the main line wire, instead of being connected directly to the magnets M^1, M^2 , has interposed in it a polarized relay whose armature, when attracted,

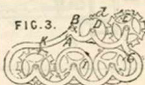
makes contact with one or other of two stops so that one or other of the magnets M^1 , M^2 is energized to move the pointer P forwards or backwards.

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

464. Greg, S. Jan. 27.

Logs.—The first spindle A of the counter carries a pointer and also a pinion B gearing with a wheel having 30 teeth secured to the wheel or plate D. The tooth d of the wheel D gears with the wheel E and turns it one tooth for every complete revolution. The wheel E carries a plate similar to D which gears with a toothed wheel secured to the wheel G, which carries another pointer, and so on through the series of wheels, each toothed wheel carrying a plate, the tooth of which gears with the next wheel. In place of pointers the indices may be secured to the wheels and caused to revolve, the numbers being shown through openings.

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



which is movable about a second axis according to the pressure of the wind. The axis of the cups communicates at one time with a part only of the recording-apparatus, which is divided into eight or more separate recorders, each serving to record one direction of the wind only. These separate recorders are arranged in a circle and each bears a crown-wheel by which motion is communicated to the dials, and each crown-wheel is moved only when the axis of the cups passes vertically over it. The motion is communicated by means of a conoid which moves with and under the cups around the principal axis when in contact with the crown-wheel and receives its motion through a Hooke's joint.

871. Woodhouse, O. E., and Rawson, F. L. Feb. 16. *Drawings to Specification.*

Eyeglasses, lenses, &c.—Relates to special forms of incandescent electric lamps which can be adapted to jewellers' eyeglasses, microscope condensers, and lenses, &c. The lamps are generally flat in form and perforated with one or more apertures, the filaments being arranged around the aperture. The lamps may be provided with screens, to reflect the light in any particular direction, or to hide it from the eye when looking through or between the filaments; or a portion of the lamp may be constructed of, or coated with, opaque material for the same purpose. The lamp glass may be thickened to a lenticular form, or the lamps may be combined with lenses, prisms, or mirrors.

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

504. Marlow, E. Jan. 30.

[*Provisional protection only.*]

Lenses.—Relates to means for focussing microscope, telescope, opera-glass, magic-lantern, and photographic &c. lenses by means of a pin working in a spiral groove. The groove and pin are respectively in the lens tube and the outer sleeve, or vice versa. The outer tube is lined with velvet &c.

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

975. Pass, E. de, [*Elliott, A. H.*]. Feb. 22.

[*Provisional protection only.*]

Eyeglass springs.—The steel is first polished and then reduced to the finished size by rolling or hammering; it is afterwards tempered by immersion in a bath of ether or ammonia.

Abridged also in Classes *Manufacture of iron &c.*; *Metals, Cutting &c.*; *Watches &c.*

568. Blakely, W. Feb. 1.

[*Provisional protection only.*]

Tripod stands for fire-engines. A portable stand having rule-jointed legs, and a loose ring notched to engage the legs and lock them rigidly in position when extended, is fixed to and supports a ring in which rests a canvas basin, or bucket with a flanged wooden bottom. This has an aperture connected by an india-rubber &c. hose-pipe with the tank of the engine controlled by a stop valve, so that water passed into the bucket or basin flows into the tank.

Abridged also in Classes *Fire, Extinction &c.*; *Photography.*

989. Leo, A., and Marks, P. S. Feb. 23.

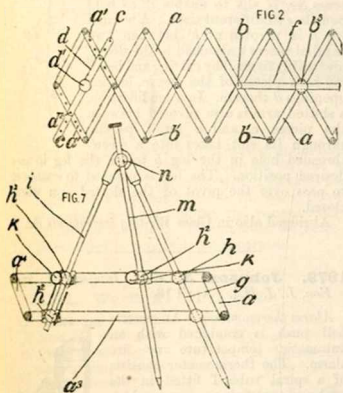
Mathematical dividing and measuring instruments.—An instrument is constructed, in one form, on the lazy tongs system, Fig. 2, the bars a , a of which are drilled and pivoted on equidistant centres b , b . The pivots b^1 are made to hold pencils, pens, or marking-points. A cross-rod c held on the perforated arms a^1 , a^1 by the tie-piece d and screw d^1 still further reduces the space of the first cell by subdivision. A stay-rod f pivoted at b passes through a stud b^2 and steadies the tongs. A modified form is used for dividing arcs and circles wherein the pivot centres are laterally shifted. In another form, as shown in Fig. 7, a third leg m is passed through the head of a pair of compasses i , g and passes through a slot h , h^2 on the parallelogram a^3 , a^4 ; the legs of the compasses i , g also pass

672. Stanley, W. F. Feb. 7.

[*Provisional protection only.*]

Anemometers.—Consists in fitting the revolving cups or vanes, as usually employed, upon an axis

through slots on the parallelogram at h, h^2 . The space between the legs i, m, g are regulated by



screws k on the parallelogram fixing the legs i, m . A modified form of the instrument may be employed to determine the centres of circles.

1065. **Bagot, A. C.** Feb. 27.

[Provisional protection only.]

Anemometers.—The instrument comprises a set of rotating cups whose spindle acts, through a train of wheels and rack and pinion, to make and break an electric circuit each time the cups make a certain number of revolutions.

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

1180. **Whish, J. T.** March 5.

[Provisional protection only.]

Range-finders.—Two sets of bearings for a telescope are arranged upon a tripod stand so that their axes are at right angles to each other. A straight graduated bar is also mounted on a vertical pin, so that it can be turned in any direction. Having two instruments, the observer places the telescope in one set of bearings, and directs it at the object whose distance is to be measured, and by transferring it to the other bearings reads off the division crossed by the axis of the telescope on the graduated bar. The same operation is repeated at the other end of the measured base, and from the readings the distance of the required object can be computed. Ordinary theodolites with graduated bars may be used either when the angles at the base are right angles or when they are not, in which latter case the bars would be placed at the proper inclinations.

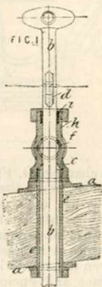
1467. **Maudslay, A. E.** March 20. *Drawings to Specification.*

Magnetic compasses are suspended by a ball-and-socket universal joint.

Abridged also in Classes *Cooking &c.; Furniture &c.; Lamps &c.; Ships &c., Div. I.; Table articles &c.*

1510. **Stopes, H., and Crockford, W.** March 22.

Thermometers.—Relates to means for taking the temperature of the contents of closed vessels, by which a thermometer can be inserted and withdrawn without any of the contents escaping. The thermometer is enclosed in a case b which passes through the side &c. of a mash tun &c.; the lower end of this case b is perforated and its upper end has a slit d for showing the scale of the thermometer. A union joint or screw connection c^1 passes through the side &c. of the vessel; with it is a cock &c. f through which, when open, the case b passes. The cock has a long neck h with a stuffing-box i . When the thermometer is to be drawn out, it is drawn, with the case, past the cock, which is then closed. In a modification, a metal pocket is fixed into the vessel into which the thermometer is inserted.



1517. **Walbrodt, H., and Wolff, W.** March 22.

[Provisional protection only.]

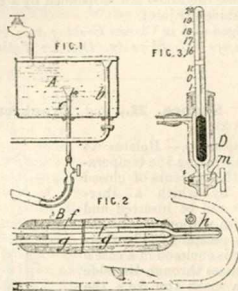
Kaleidoscopic apparatus for multiplying a pattern &c. so that its effect, when repeated, can be seen. The pattern is placed on a stand and lighted by a mirror; round it are several mirrors forming a hollow prism, at the centre of which is the pattern. These mirrors, which are adjustable about a vertical axis, multiply the pattern in a horizontal direction; these images are then multiplied in a vertical direction by another set of adjustable mirrors placed one above the other on adjustable supports.

Abridged also in Class *Toys &c.*

1698. **Wise, W. L., [Boulier, A., and Boulier, E.].** April 4.

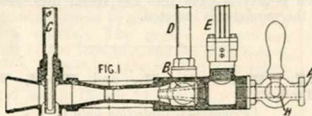
Pyrometers.—A moving liquid of constant temperature and constant rate of flow through a constant orifice conveys a proportionate amount of heat from the object to be tested to a specially graduated thermometer registering the temperature by photography. Water in a cistern A is kept at a constant level by an overflow pipe b . A pipe c from the cistern is connected by a flexible tube to

a thin metal tube *f*, Fig. 2, which opens out into a thin metal chamber *h*, communicating with a thin metal tube *g* which is connected by a flexible tube



to a chamber *D*, Fig. 3, with a cock *m* for regulating the flow, and a thermometer *C*. The two tubes *f* and *g* are enclosed in a fireclay case *B*, which is brought into contact with the fire &c., the temperature of which is to be measured. The temperature is registered photographically on a clock-driven drum provided with sensitized paper on its surface and enclosed in a case with a narrow slit, placed behind the thermometer.

1739. Longsdon, A., [Krupp, A.]. April 6.

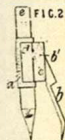


Pyrometers.—Relates to the apparatus, described in Specification No. 1271, A.D. 1873, for ascertaining the temperature of hot air (especially of the blast of blast furnaces), in which the hot air is mixed with cold air and the temperature of the mixture taken. The improvements relate to the means for taking the temperature of the cold air and to means for maintaining the hot blast at a constant pressure. The apparatus is in the form of an injector; hot air enters at the end *A*, its pressure being indicated by a mercurial manometer *E* and regulated by a cock *H*. The cold air is drawn through an opening *B* and its temperature indicated by a thermometer *D*. The temperature of the mixture is indicated by a thermometer *C*. The difference of the two readings is multiplied by a constant co-efficient to give the temperature of the hot blast. By means of a sliding graduated index on the cold-air thermometer *D*, which index is constructed on the basis of the co-efficient, and the zero of which is made the temperature indicated by the other thermometer, this difference of temperature may easily be read. The cold air may be forced in at *A* and draw the hot air in at *B*. The apparatus may also be of a portable form with a non-conducting handle.

1841. Lane, E. April 11.

Compasses, drawing.—A sleeve *a* of brass &c. is slit to enable it to hold pencils *e* of different sizes. A pointed leg *b* is pivoted at *b'* between two parallel pieces *c* attached to the sleeve, preferably formed by cutting and bending back pieces of the sleeve, leaving openings *d* therein. In a modification, a slotted arm is also pivoted between the pieces *c*, and a screw passing through its slot takes into a screw-threaded hole in the leg *b* to fix the leg in any desired position. The leg is notched to enable it to pass over the pivot of the slotted arm when closed.

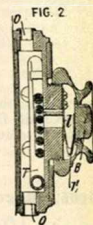
Abridged also in Class *Writing-instruments* &c.



1879. Johnson, J. H., [Jeanjean, A., and Eon, L. J. H.]. April 13.

Alarm thermometers.—An electric bell push is combined with an automatic temperature or fire alarm. The thermometer consists of a spiral tube *T* fitted in the push and containing mercury, which is always in contact with a platinum wire connected with one of the circuit wires, which makes contact to send an alarm with another wire connected with the other circuit wire, when it expands sufficiently to enter a slight enlargement formed in the thermometer tube. This enlargement is formed at such a part that the alarm is sent when a given temperature is reached. It also allows the mercury to rapidly retire and break circuit when the temperature falls. Holes *O*, which may be fitted with eyelets or tubes, give free access of air to the thermometer.

Abridged also in Classes *Bells* &c.; *Electricity* &c., *Div. III.*; *Fire, Extinction* &c. *of*.



2040. Johnson, J. H., [Parenty, H. L. J.]. April 21. *Drawings to Specification.*

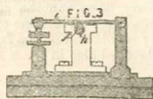
Barometers.—A barometric tube having an enlargement at its upper end of an area equal to that of the annular surface in the cistern is connected to a movable vessel suspended from a balance beam provided with a pointer. For recording the indications, a roller is made to slide radially over the surface of a uniformly-rotating disc by a cam attached to the pointer, the speed of the roller corresponding to its distance from the centre of the disc.

Thermometers.—A movable vessel suspended from an indicating balance beam is connected to a vessel containing a liquid capable of considerable variation of volume with variations of temperatures.

Abridged also in Classes *Gas distribution*; *Hydraulic machinery* &c.; *Registering* &c.; *Valves* &c.

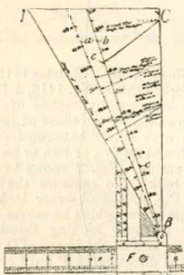
2041. Thompson, J. April 21.

Anemometers, especially for measuring the velocity of air currents in mines. Relates to electric indicating and recording apparatus for use with a set of "Robinson's cups." The revolving spindle carrying the cup-arms is connected by bevel-wheels with a shaft *f*. A cam *h* lifts a contact lever *i*, and so breaks and makes an electric current at each revolution of the shaft. The circuit is in connection with a suitable beating apparatus, whose beats denote the speed of revolution of the cups per minute, and consequently the velocity of the wind. The number of beats may be recorded by any suitable apparatus.



2114. Wood, F. H. April 26.

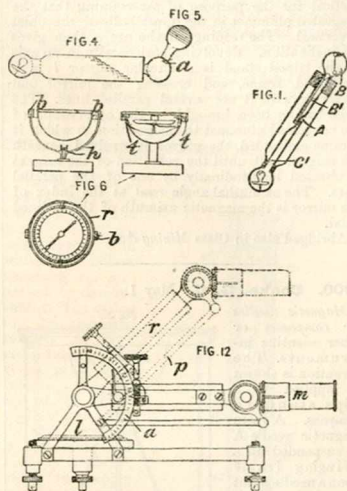
Drawing instrument for setting out geometrical figures and dividing the circumferences of circles into equal parts &c. A sector or triangle ABC has marked on it radial lines *a* and *b*; the angle CBB is 18°, one-fourth of the angle subtended by the side of a pentagon at the centre; the angle CBa is 22½°, one-half of the angle of an octagon, and the angle CBA is one-half that of a hexagon. On these radial lines are holes *c* forming a scale. To draw a circle the instrument is laid on the paper, a pin put through the hole B, and a pencil placed in any hole *c*; the circle may then be divided into equal parts by the holes *c*. Other holes mark off degrees &c. A scale may slide in the part F and the whole used as a T-square. The triangle ABC may be used as a set square.



2143. Lake, W. R., [Macgeorge, E. F.]. April 27.

Clinometer compasses, principally for use with deep-boring apparatus. In one form a phial A, Fig. 1, is used, having a bulb at each end filled with some fluid, preferably one which will solidify upon cooling. The lower bulb contains a magnetic needle attached to a float pivoted on a rod passing into the bottom of the bulb. To prevent the escape of the float and also the formation of air-bubbles a tube C' is socketed in the neck of the bulb. The upper bulb B contains a similar socketed tube B' and also a plummet which floats in the fluid to assume a constant vertical position. The positions of the plummet and float can be reversed. In a

modification, the magnet float is placed in the upper bulb and the apparatus adjusted so that the connecting line between the float and magnet will, when the upper bulb only is visible, give the vertical,



and the magnet the meridian. The upper bulb may contain only a bubble *a*, Fig. 4; on the fluid congealing, the bulb or phial may be replaced by a spirit level, the position of the bubble indicating the angle of solidification. Or the instrument may be used with or without a lower bulb containing a magnet, and be graduated in parallel circles, Fig. 5, to indicate the position of the bubble. In Fig. 6, the instrument takes the form of a box compass arranged and suspended in gimbals rings. When the arms of the spring-supporting fork close together, by the withdrawal of a pin *h* actuated by clockwork, they clamp on the bearings *b*, *b*, and compress the ring *r*, causing a corresponding expansion in the transverse direction so that the conical ones *t*, *t* are drawn partly out of their bearings and the compass-box is accordingly clamped. A stop lever simultaneously presses the needle against the glass cover. The instrument may now be removed for inspection and the azimuth ascertained. In each modification the clinometer is included in a guide tube and forms a complete apparatus which may be used for testing the deviation of bore holes. The instrument may also be combined with a core extractor in such a way that the lay of the strata may be determined by an inspection of the core after removal. Fig. 12 shows an instrument for taking readings from the first described forms of the apparatus. The bulb tube is inserted in a holder on an arm *r* which carries an index and moves round an arc *a*, *a*. At the end

of the arm are fixed the links of the parallel motion p and also two microscopes m , which are fixed together and are kept with their axes at right angles and horizontal in all positions. In the inner end of each microscope are stretched hairs placed vertical for the purpose of ascertaining that the congealed plummet in the upper bulb of the phial is vertical. The reading on the arc a then gives the inclination. Revolving horizontally in an axis in the tripod stand is a circular mirror l in a graduated frame, and crossing the mirror and revolving with it are several parallel lines. The phial having been brought by the observation of the congealed plummet to the position in which it became embedded, the mirror is revolved beneath the magnet bulb until the reflection of the magnet is bisected longitudinally by one of the parallel lines. The azimuthal angle read at the index of the mirror is the magnetic azimuth of the inclined phial.

Abridged also in Class *Mining &c.*

2200. Cooke, G. C. May 1.

Magnetic needles for compasses or other scientific instruments. The invention is shown as applied to a ship's standard compass. A main magnetic needle A is suspended in a swinging frame upon a needle point E , and above it is arranged a subsidiary needle P floated upon a second needle point O carried by the upper part of the swinging frame. A small dial, attached to the subsidiary needle, is arranged in the same plane with an annular dial connected to the swinging frame of the main needle. When contrary divergence is induced by magnetic disturbance, distinct readings of the two dials are obvious, and the deductions, as to the true meridian, may be easily made. More than one subsidiary magnet may be employed, and they may be arranged in various positions.

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

2292. Scott, A. T. H., [*Langdale, J. M.*]
May 5.

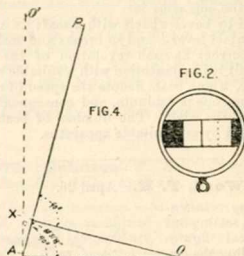
[*Provisional protection only.*]

Ship's log and current meter.—The rotator is mounted on a shaft revolving on friction rollers in a pointed cylindrical case. An insulated copper towing-wire passes through the ebonite point of the cylinder and terminates in a platinized brass spring placed above a similar one over an eccentric on the rotator shaft, every revolution of which makes an electric contact and causes a mark to be made on tape or other suitable recording

appliance. In the electric circuit is a mercury glass on the hour glass principle, and only while the mercury flows can the current pass to the recording machine. The time of flow of mercury during every revolution of the fan is shown on a dial.

Abridged also in Class *Registering &c.*

2589. Weldon, F. May 24.



Range-finder.—Relates to the invention described in Specification No. 1416, A.D. 1879, for measuring the distance by means of known angles. The known angles are those of prisms, which may consist of a single hexagonal prism reflecting three different angles, or two or more placed in the same mounting. Fig. 2 shows two prisms placed back to back. To measure the distance from A to O , Fig. 4, the observer looks through the lesser angle prism, which he moves until he sees O covering P ; now looking through the right-angled prism he sees the image of O at O' ; he then moves in the direction of P until he sees the image of O at P . The distance AX will then be some definite fractional part of the distance AO depending on the angles of the prisms. The distance AX may be measured directly or by a third prism.

2692. Thompson, W. P., [*Chapin, H. A.*]
May 30.

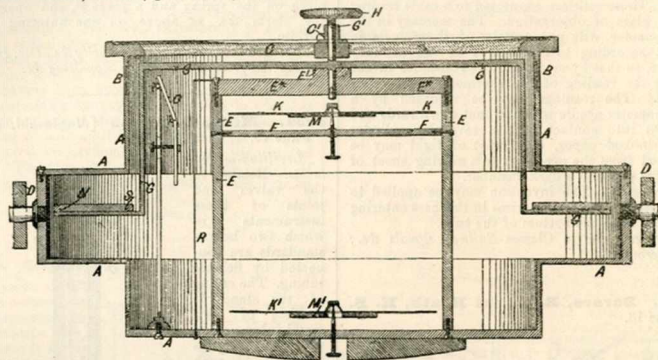
[*Provisional protection only.*]

Hygrometric apparatus for controlling sliver trumpets in machines for preparing cotton, applicable also to other apparatus. The object is to eliminate changes in the vibratory movement of trumpet governors for railway heads except those changes due to variation in the weight of the sliver. The hygrometric governor consists of one or more posts of soft wood &c. cut transversely to the grain, each post having a cap at one end attached by a metallic strap to a socket at the other end. By an arrangement of levers &c., the contraction or expansion of the material composing the posts, depending upon the dry or moist condition of the atmosphere, imparts movements which are transmitted to a lever acted on by a counter-balance weight to compensate for the variable resistance of the sliver on the trumpet.

Abridged also in Class *Spinning.*

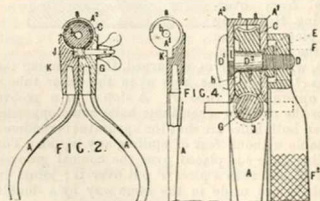
The scale is raised from the paper by two end supports; through a central slot in the scale pass two plates, one with a needle indicator to read the scale and the other with a finger plate to propel a T-shaped sliding plate supporting an offset scale. A needle wire is drawn between the two end supports just above the paper and a pin is fixed under the beginning of the scale to fix the scale on the paper.

3114. **Lake, W. R.**, [Bisson, E.]. June 22.



Magnetic compasses, specially for use on iron ships. Two independent needles are mounted one above the other, in conjunction with an alidade fitted with two magnets. The lid B of the weighted copper box A is graduated at its edge for the alidade. A circular frame E of copper has two cross-bars E' and F, the former forming a bearing E' for the alidade G and its magnets N, S which may be turned by a removable head H. The two independent needles M and M', which are supported on adjustable pivots are of the same length but not of the same mass and are therefore not placed at the same distances from the magnets of the alidade. The two needles are read simultaneously by means of two mirrors O, O', or by a prism. A vertical hair R forms a guide line for the needles. A circular suspension D, in a plane equidistant from the two cards K, K', supports the instrument by two journals on the box A, in such a way as to protect the needles from shocks &c.

3163. **Clark, A. M.**, [Mitchell, W. II.]. June 26.



Compasses, dividers, &c.—A fine adjustment by worm-wheel and worm is fitted in the joints. The two legs A have heads A' and A'' with flanges *a* so that they form a box enclosing a worm-wheel C with one face *h* recessed. A bolt D with a tapering shank D', a square head *l*, and a nut E holds the whole together. On the screw end of

this bolt D is a cap F with a key F' by which the joint may be made loose or tight. A spindle G in one leg has a worm J gearing with the worm-wheel. For the first adjustment the cap F is loosened, and on turning the spindle G, by reason of the greater friction between the wheel C and the head A' than there is between the wheel and the head A'' (due to the recess *h* in the wheel), the wheel is held against the head A' while it moves with respect to the other head A''. When the rough adjustment is made by hand the head A' slips over the wheel.

Abridged also in *Class Registering &c.*

3298. **Christensen, H. O.** July 3.

[Provisional protection only.]

Barometers.—Relates to devices by which a fall of the barometer causes an electric bell to ring. For nautical purposes a mercurial barometer is hung in gimbals and enclosed in a case, to which is attached an index regulated by a rack and pinion. The lower end of the rack works in the turned-up

end of the mercury tube so that when a fall in the mercury causes a corresponding rise in the return end, contact with the rack is made and a bell in circuit is rung. When applied to aneroid barometers an adjustable metal index hand is fitted, passing through the glass face and having its inner end turned up to meet the usual index hand. The other end is fitted with a handle for adjustment and is connected to the metal rim of the case. The metal frame of the instrument is so insulated that an electric circuit is completed when the two index hands meet and a bell is thus rung.

3306. Holmes, A. L. H. July 4.

[Provisional protection only.]

Theodolites.—A vertically or horizontally placed metal drum carrying a telescope is revolvably mounted on a stand. The periphery of the drum is divided by a series of vertical lines into divisions of, say, 15°, and two horizontal lines are drawn round the drum cutting the vertical lines and forming parallelograms through each of which a diagonal line is drawn. The vertical lines are numbered from 0 to 360. A vertical vernier scale with offset point is used, adapted to the periphery of the drum and provided with suitable clamps to allow of the relative adjustment of the two. The instrument may be suspended by gimbals.

3490. Boulton, A. J., [Knieper, H. W.] July 16.

[Provisional protection only.]

Leclis.—A straight-edge has at its middle a chamber in which is mounted a spindle carrying a pointer moving in front of a dial, and kept vertical by a weight on the spindle. The reading may be facilitated by having two or more arms on the pointer.

3539. Kelway, C. E. July 18.

[Provisional protection only.]

Telemeter.—The distance of the object is determined from the angles subtended at the ends of a base. The apparatus described for use on board ship consists of a graduated slotted rule with a graduated straight-edge centered at one end, and a graduated straight-edge on a centre sliding in the said slot; sectors indicate the angles these straight-edges make with the rule. The first straight-edge is set corresponding to the angle of the first sighting with the course of the ship, and when a determined distance is run by the ship the movable centre is brought to the corresponding position on the rule, and its straight-edge set at the angle of the second sighting. The intersection of the straight-edges will indicate the position of the object. In a modification, used in case the ship's course is altered between the times of the two sightings, a graduated slotted arm is fixed to the movable centre, and the second straight-edge is on a movable centre in this slot; the first part of the course being represented on the rule and the second part on the said arm. In another modification, the angles subtended by two distant objects of known distance apart are made use of.

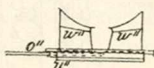
Abridged also in *Class Registering &c.*

3676. Groth, L. A., [Loeb, B.] July 27.

Eye protectors.—A frame surrounding a glass or mica disc is passed airtight through a groove, and in a second groove moves a double-curved wire o^{11} , which actuates sight tubes w^{11} movable in grooves u^{11} , the ends of the wire passing through stuffing-boxes filled with glycerine wadding. To enable the glass or mica to be cleaned, a wiper, covered with wool or leather, and fitted with a handle, is placed behind it. Or the smoke glasses may consist of two separate sight tubes fitting close to the eyes and connected together by an elastic band; and the glasses or mica are either surrounded by and cemented to the tubes, or are pushed into grooved frames.

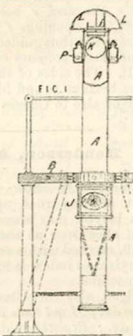
Abridged also in *Classes Bells &c.; Fire, Extinction &c. of; Medicine &c.*

FIG. 31



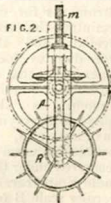
3684. Biggs, B. July 27.

Magnetic compasses.—To place the compass outside the influence of the local attraction of iron ships, it is carried in a box I at the top of a long tube A gimbaled to a platform B. The card is read on deck by means of a mirror J. The tube is weighted at the bottom to keep it perpendicular, and may be provided with springs, as shown, to prevent undue oscillation. The tube is fitted with a cover glass L, sight holes K, and lamps P.

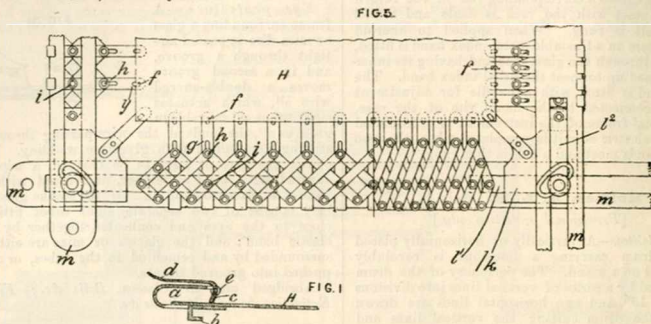


3696. Engel, F. H. F., [Pezoldt, C.] July 28.

Logs.—A small paddle-wheel R, which may be constructed to feather, is mounted in a frame A, which can be lowered in guides through the bottom of the vessel. The revolutions are transmitted by gearing to the vertical shaft m in connection with a counter and dial, or scale and index, indicating either the number of revolutions or the speed of the vessel.



3697. Pieper, C. July 28.



Pantographs.—Relates to the extension frames of india-rubber pantographs for printing in colours and enlarging and reducing. The india-rubber diaphragm H is held to the extension frame by clamps, Fig. 1, each of which consists of a body *a* with a hook *b*. On the body *e* is pivoted a double-armed lever *d, c*, the arm *c* holding the diaphragm. Fig. 5 shows the extension frame; the hooks of the clamps fit into openings *f* in the cramp holders *g*, which are attached at two points *h* and *i* to lazy-tongs. The clamps are thus guided parallel to one another. The bolts at *h* move in slots. Each corner of the extension frame consists of a plate *k*, with ribs *l* and *P* in slots in the frame, which is held to the frame by a bolt. The sides of the frame are in this manner kept at right angles. The extension frame, by means of borings *m* and bolts, is attached to a screw frame for stretching.

Abridged also in Classes *Printing, Letterpress &c.*; *Printing other than letterpress &c.*

3833. Henderson, A. C., [Rothgiesser, G.].

Aug. 7.

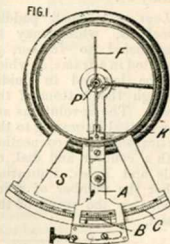
Clinometer.—To show the gradient of any road upon which a bicycle may stand, a piece of sheet iron as shown at Fig. 9, marked with a scale and carrying an index, is fixed to the machine.

Abridged also in Classes *Bearings &c.*; *Hand tools &c.*; *Lamps &c.*; *Registering &c.*; *Trunks &c.*; *Velocipedes.*



3929. Allison, H. J., [Gloer, H.]. Aug. 14.

Magnetic compasses.—Relates to instruments for determining the true meridian, and the error due to local influences, as that of iron ships. The instrument is also applied to surveying instruments. A movable index arm A is centered under the needle F, and carries a vernier scale B and an index point K. A sector S carries a scale C. Below

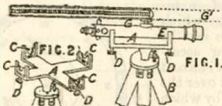


the sector and parallel to its centre line is a fixed needle which will exert its influence upon the free needle and cause it to assume a nearly like direction whenever the instrument has been partly revolved in azimuth. It is stated that the arc between the two needles will give the difference between the magnetic and the true meridian, so that by revolving the instrument in azimuth until the free needle coincides with the zero or index the true meridian can be found. Any local disturbance is found by placing the instrument in azimuth east and west and rotating the index arm; the arc between the needle and the index point K will then indicate the local disturbance. The scale C has thirty-two divisions on either side of the zero point, the vernier, representing $\frac{1}{2}$ and part of a circle, reading to tenths and giving a value of $11^{\circ} 15'$ to each point, which represents the force acting on the needle. The length of the free needle to that of the fixed needle may be as 18 to 16, which corresponds to the difference between the equatorial and magnetic planes.

4056. Whish, J. T. Aug. 21.

Telemeter.—A frame A having four arms is mounted on a tripod stand B, and has two sets of bearings for a telescope at right angles with each other. A graduated bar is mounted on the telescope E by a pivot G, capable of being turned as shown to G'. In a modification which obviates the shifting of the telescope, the telescope is made double, one tube crossing the other, and adjustable by means of screws. The observer, having two

of the instruments, places the telescope in one set of bearings and directs it at the distant object, and by transferring it to the other bearings reads



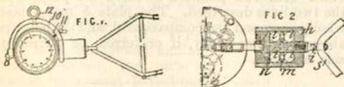
off the division crossed by the axis of the telescope on the graduated bar. The same observation is repeated at the other end of the measured base and from the readings the distance of the required object can be computed. Ordinary theodolites, fitted with the graduated bars, can be used.

4163. Enright, J. Aug. 28.

Thermometers, barometers, &c.—Conducting wires are let into the thermometer or other tube (which is preferably made of vulcanite) at suitable distances, and are connected in series by resistances to form part of an electric circuit to the place where the indication is required. Rise of mercury diminishes the resistance, which is measured by a modified Wheatstone bridge where it is balanced against resistance coils in connection with a galvanometer as usual, by moving a slider along a course graduated to form a model of the barometer or thermometer tube. According to the Provisional Specification a very thin straight or coiled bad conductor fixed longitudinally in the tube might be used.

Abridged also in Classes *Railway signals &c.*; *Registering &c.*

4212. Clark, A. M., [Garland, L. M.]. Aug. 31.



Logs.—The rotator is attached to the line by passing the latter through a boss; a knot on the end of the line is then pressed by a screw against a shoulder inside the boss. The tow line is a plaited one and is weighted near the rotator and sheathed with cotton to keep the rotator below water. Near the registering mechanism is a stretcher which acts as a flywheel. Fig. 2 shows the bearings. The eye *i* through which the line *s* passes is fixed to a spindle with a head *n* and washer *m*; it works with two nests of ball bearings *l, l* in a case *h*, and is attached by a clutch coupling to a worm which works the registering mechanism. In a modification there is only one nest of stone &c. balls in the bearings; there are also oil holes in the bearing case covered by a ring with corresponding holes. The indicator has two hands moving over the same dial, one ten times as fast as the other. It is suspended, as shown in Fig. 1, in a bow frame

10 which swivels on an axle at 8 and end in a spar above deck. The dial can be turned to one side or the other as desired and fixed by a screw 11. The swivel eye 12 may be replaced by a ring which can be slid either way on a spar projecting aft, by means of cords passing through an eye at the end of the spar.

Abridged also in Class *Bearings &c.*

4297. Lake, H. H., [Holden, C. W.]. Sept. 6.

Microscope and other stands.—The invention is specially designed for telephonic transmitters and receivers, but is stated to be applicable for microscopic and other instruments. A tubular standard C, provided with a flange A for securing to a table &c., receives a screwed tube D adjustable vertically by means of a nut E, and provided with circular flanges H, L for engaging the flange J of a second tube K, and so forming a movable joint therewith. The upper part M of the second tube is turned horizontally, and carries at its end a vertical cross-piece O, to which the receiver Q and transmitter P are each connected by means of two pairs of joints R, S, T, U and a horizontal telescopic arm V. Each joint is formed of a central plate pivoted between two outer plates, and in each pair of joints one is vertical and the other horizontal, to form a universal joint for enabling the transmitter and receiver to be moved into any position. The electrical connecting wires pass through the tubular standard &c. to the receiver and transmitter. Stops are placed in each joint to prevent more than one complete rotation in any direction, thus preventing any twisting or winding of the wires. Washers may be placed between the plates of the joints to prevent them moving too freely. In a modification, the clamps W carrying the transmitter and receiver are pivoted in sockets, and several of the joints and the screwed tube D are dispensed with. In a further modification, the tubular standard C, screwed tube D, and bent tube K, M carrying the cross-piece O, are replaced by a pair of pivoted arms, one of which is connected to a wall plate or bracket by a pair of joints, while the other is connected by a similar pair of joints to a telescopic arm carrying the cross-piece. The apparatus is described at great length in the Specification, and the parts are detailed in a long series of claims.

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

4434. Derham, T. Sept. 17.

Hydrometers and saccharometers.—The instruments are provided with sinking weights to indicate specific gravities over an extended scale in such a manner as to obviate the need of tables of corrections. The addition of the ordinary sinking weight to a hydrometer gives a new range of gravities, but the fixed scale does not give correct indications for the new range, and a table is generally used to show the real specific gravity that corresponds to the indication of the instrument. By making the middle range correct instead of the first range and the middle figure instead of the initial figure of each range correct, the error is more equally divided, and the maximum error is only one-quarter of the maximum error in the other case. By dividing the required range of gravity into a sufficient number of intervals, "the discrepancy may be minimized to the vanishing point," or with a less number of sinking weights, each weight may be stamped with a "factor" or "multiplier" the product of which with the reading of the instrument is added or subtracted as the case may be. A method of graduating such instruments by calculation from the weight, bulk, &c. of the instrument and its sinking weights by means of water at 60° Fahr. but without the use of artificial test liquids, is described. By the use of poises or sinking weights made of materials of low specific gravity, e.g., aluminium or ivory, "the discrepancy between the real and indicated gravities also diminishes," and by adding a certain part of the weight at the top of the stem where it is not submerged, the discrepancy may be still further reduced. The required specific gravities of the sinking weights may be got by varying their composition if they are made of such material as vulcanite, or by combining a light material with a heavy metal. Details are given, with calculations, also tables of the discrepancies under varying conditions.

Abridged also in Class *Brewing &c.*

4443. Siemens, W. Sept. 17.

[Provisional protection only.]

Photometers and pyrometers.—Consists in a method of determining the energy from any radiating source and expressing it in any unit of energy. A simple or compound prism, or "Rutherford's grating," is mounted adjustably in a frame, and behind is arranged, between two parallel surfaces, a series of cavities with reflecting surfaces. These cavities are arranged in a curve to ensure equal distribution of the rays. In each cavity is placed the black bulb of a thermometer, the stem of which projects through the casing so that its indications can be observed. The rays are distributed to the different cavities to act on the different thermometers, according to their relative refrangibility, and the proportion of heat and light in the rays from any source is thus measured. Means may be taken to preserve a photographic record of the readings of the thermometers, and the latter may be replaced by the pyrometers.

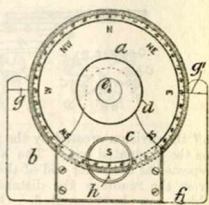
Abridged also in Class *Photography.*

4634. Lilley, G. C. Sept. 28.

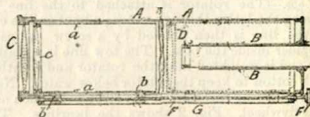
Course indicator and corrector.—

Consists of an instrument by which the course can be laid off or ascertained without movement over the chart, and by which the corrections for deviation are mechanically made. A compass card *a*, or a disc marked with degrees, is mounted freely on a centre, and is surrounded by a flat plate *b*, which, with the plate *c*, forms the bearing. The axis of the compass card, which is provided with a thumb piece *d* for rotation, has a hole *e* to enable the position of the card on the chart to be ascertained. A straight-edge *f* is formed on the plate *b*, and two lines *g, g'*, which, if continued, would pass through the axis, are drawn on the plate parallel to the edge *f*. A mark *h* placed on the lower part of the flat plate *b* enables the direction to be seen when steering a meridian course. A straight-edge is applied on the chart from the point of departure to the destination; then the straight-edge *f* is placed against the other and moved until the nearest meridian appears in the middle of the centre hole. The compass card is then turned until the N point is on that meridian, when the true course is shown by the index line at the side of the instrument. The apparatus may be employed to make corrections for magnetic deviation, and for the deviation of the compass when sailing by a book of directions without charts. In modifications, the plate *b* is dispensed with, and the plate *c*, with the card on one side and the thumb piece on the other, is provided with two pointers to serve the purpose of the two lines described. The plate *b* may almost wholly surround the compass card, and the pointers above mentioned may, if preferred, be carried by side supports.

FIG. 1



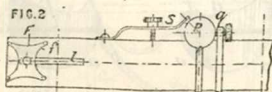
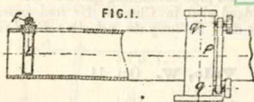
4655. Cameron, D. R. Sept. 29.



Telescopes &c.—The object glass *C* is divided into one or more adjustable parts which may be separately focussed with the eye-piece. The lens *e*, mounted in a short tube *a, a*, is adjusted by means of a screw *F* working in lugs *b, b*, its extreme position being indicated by dotted lines; part of this lens is removed to allow the rays refracted by the object line *C* to form an image of the distant object at the crossed wires; the part remaining serves to bring the rays from the nearer object to a focus at the same point; both images

may now be viewed at the same time by the eyepiece. The casing G protects the actuating screw F and the slot in the tube A through which the lugs *b, b* pass. The tube B carries the eye-piece tube and the fitting D for the crossed wires. It is stated that the invention may be applied to reflecting telescopes.

in the tube. The telescope bears against a vertical axis P, round which it turns, by four feet



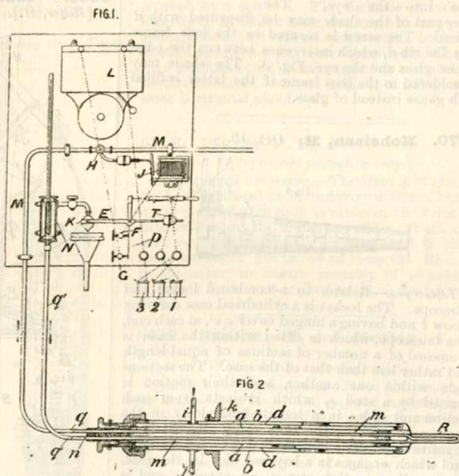
p, p, q, q, of which *q, q* are adjustable. A spring S holds the telescope to the upright.

4682. Darwin, H. Oct. 2.

Levels, theodolites, &c.—Relates to the adjustments for maintaining the optical axis of the object glass constant, and for ensuring its perpendicularity to the axis of rotation. The object glass L is connected by a pin to a frame F with four feet *f*, which slide on a part of the telescope tube truly turned; the pin passes through a slot l

4751. Wise, W. L., [Boulter, A., and Boulter, E.]. Oct. 5.

Pyrometers.—Relates to the invention described in Specification No. 1698, A.D. 1883. Consists in indicating any diminution in volume of the heat-conveying liquid by an electric bell, a further diminution causing the current of liquid to be shut off; also in protecting the tube conveying the liquid in the furnace from injurious radiation. After the temperature of the liquid that has been through the tubes in the furnace, has been taken by a thermometer N, it flows into a funnel K on the balance E. When there is any diminution in the rate of flow of the liquid, the funnel K becomes lighter, and a flexible plate *p* on the balance, by touching a contact G, puts one cell in circuit with a bell L. When there is a still greater diminution in volume, the plate *p* touches the contact F and puts two cells in circuit with an electromagnet J, to the armature of which is connected a cock H in the pipe M from the cistern; the flow of liquid is thus stopped, and explosion prevented.



The tubes *q* and *q'*, which convey the liquid, are enclosed in a tube *a* and surrounded by a non-conducting material *m*, where they are not submitted to radiation. The tube *a* is surrounded by a tube *b* with a partition *d* between the two; through these spaces liquid flows by the tubes *i, j*, the temperature of this liquid being between the temperatures of the liquid which enters at the tube *q* and that which leaves at the tube *q'*. A micrometer screw *n* in the cap on the tube *b* is used to vary the surface R exposed to radiation.

4768. Heyworth, R. Oct. 8.

[Provisional protection only.]

Climometers.—These are fitted to vehicles in connection with apparatus for utilizing the stored-up momentum of the vehicle to re-start it or assist in propelling it uphill, and serve to show the driver when he should throw the apparatus into action. A dial is provided with a finger which maintains a vertical position by gravity. The dial may be stationary and the finger made to revolve by means

of a float in one of a pair of vertical branches of a longitudinal pipe containing quicksilver.

Abridged also in Classes *Air and gases, Compressing &c.; Railway &c. vehicles; Road vehicles.*

4837. Vale, W. Oct. 11.

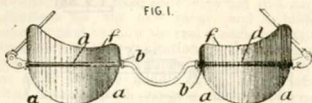
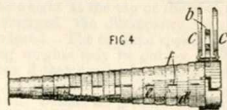


FIG. 3



Spectacles and goggles, eye-shades for.—The shade *a, a*, made of sheet metal, ebonite or other light material, is nearly at right angles to the lens *c*, the inner surface *f* fitting close into the eye. The inner part of the shade may be dispensed with if desired. The screw is secured to the lens frame by the rib *d*, which intervenes between the edge of the glass and the eye, Fig. 3. The shade may be soldered to the lens frame if the latter is filled with gauze instead of glass.

4870. Hoheisen, H. Oct. 13.



Telescopes.—Relates to a combined locket and telescope. The locket is a cylindrical case carrying a bow *b* and having a hinged cover *c, c'*, at each end. The telescope, which is fitted within the case, is composed of a number of sections of equal length and rather less than that of the case. The sections slide within one another, and their motion is limited by a stud *e*, which projects from each section and slides in a longitudinal slot *f* in the next larger section, the slots being alternately at opposite sides. The largest section carries a similar stud which engages in a bayonet slot in the case. The smallest section carries an eyeglass and is made with a flange so that it can be readily drawn out. The object glass is in the case, and when the telescope is shut up, both lenses are enclosed by the covers.

Abridged also in Class *Wearing-apparel, Dir. IV.*

4937. Alexander, H. F. Oct. 17.

[Provisional protection only.]

Barometers.—The tube, or part of it, is made of a larger diameter than in the ordinary form; from the upper part a tube of smaller diameter rises. Above the mercury, and occupying the upper part of the large tube and a part of the small tube, is alcohol or other suitable liquid. Variations in height of the mercurial column will be

indicated by a considerable rise or fall of the alcohol in the small tube, and may be read off on a scale of larger divisions than usual.

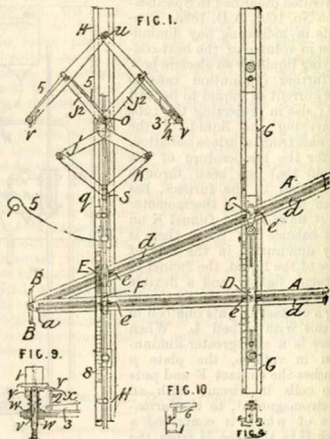
4960. Clark, A. M., [Guilbert-Martin, A.]. Oct. 17.

Thermometers, barometers, &c.—To render the level of the liquid more distinct the back of the tube is formed with a narrow strip of bright coloured enamel *a* over which is a broad white strip *b*. The narrow strip is magnified by the liquid in front of it, while just at the level of the liquid it is contracted.

Abridged also in Classes *Registering &c.; Steam generators.*



5062. Macaulay - Cruikshank, G., [Ritter, H.]. Oct. 24.



Enlarging or reducing drawings, plans, &c.—Two bars *A* are jointed at *a*, the joint being supported by horns *B*; below *a* is a tracing point which is moved over the drawing to be copied. In grooves *d* in the bars *A* slide tongues *e* to which are pivoted eyes *E, F, C, D* fixed to blocks sliding and adjustable in the bars *G, H*. On *a* bar sliding on *H* are centered at *o* bell-crank levers *J, J'*, connected by heels *s* on a rod shown along the middle of the bar *H*. The arms *J'* of the bell-crank levers are pivoted to levers centered at *u* and carrying pencils *v* to produce one or two copies. The pencils are raised from the paper as follows:—The pencil is carried in a split tube *v'*, Fig. 9, with a screw cap; this tube *v'* is inside

a tube w with a nut w' . A disc y is fixed to the tube w and carries a pin y' which passes through a hole in a plate x to which is fixed a reel loosely surrounding the tube w . A weight 1 rests on the disc y and the disc rests on a bracket 2 to which is fixed a spring 3 with a cord 4, Fig. 1, passing round the reel. A cord 5 passes round the reel in the opposite direction to the cord 4. When the cord 5 is pulled the disc y is turned and a cam 6, Fig. 10, on it rests on the bracket 2 raising the pencil; the weight 1 and the spring 3 bring it back again to the paper. For adjusting, scales 8 are provided.

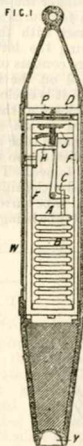
5254. Loyola, L. L. y. Nov. 6. *Drawings to Specification.*

Magic-lantern apparatus.—Relates to optical apparatus fitted to road vehicles for throwing images on a screen for advertising purposes. In the Provisional Specification it is stated that the slides may be connected together and caused to move continuously or intermittently by means of rotating drums or otherwise, so that the reflected images are repeatedly changed.

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

5256. Hannay, J. B. Nov. 6.

Sounding-apparatus.—Relates to apparatus of the pressure-gauge type. A closed cylindrical vessel B with corrugated sides is fixed to a frame F; at its upper end is a slotted arm A which moves a bell-crank lever C on which is a sector H gearing with a pinion J. On the axis of the pinion is a hand moving over a dial D and also a ratchet-wheel, the pawl of which has a tail pin projecting through the dial, so that when it is put out of gear a spiral spring brings back the pointer to zero. The whole is protected by a perforated case W. In a cavity Y is put some adhesive material for bringing up samples. In a modification, the pressure acts on the inside of the corrugated cylinder which is placed inside a closed chamber; the top of the cylinder in this case is fixed and the arm A is attached to the bottom. In another modification the whole is enclosed in a case containing suitable liquid, the pressure being transmitted by a flexible diaphragm. The Provisional Specification states that the line used is preferably a wire of manganese-bronze or other non-corrosible metal.

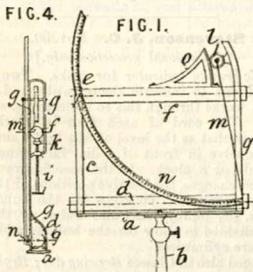


5298. Clark, A. M., [*Dany & Lepage.*] Nov. 8.

[*Provisional protection only.*]

Telemeters.—A single motion of an alidade indicates, by an index hand, the distance. A frame a

supported on a ball-and-socket joint b , fixed telescope, or pair of sights d , and on supports c and g a movable telescope &c. f on pivots e ; the opposite end of this telescope rests on a seat k



worked by a screw i . The distance is indicated directly by an index m moving over an arc n ; the index is fixed to a roller l which works by friction contact against a sector o on the movable telescope. In a modification, the instrument is mounted on a horizontal circle, the two telescopes being in the same horizontal plane.

5308. Marks, P. S. Nov. 9.

[*Provisional protection only.*]

Proportional compasses.—The joint is at the head of the instrument as in ordinary dividers, but the upper part of each limb is made in the form of a tube into which the lower part slides. Each upper part is graduated and furnished with a sliding indicator and a pin in one of these fits into a hole in the other to ensure accuracy of adjustment. A simple form is described without the telescopic limbs.

5419. Mason, S., and Huxley, C. R. Nov. 16.

[*Provisional protection only.*]

Spectacles.—Appliances are fitted for placing the nerves and muscles of the eye and ear within the influence of a magnetic field, or directly under the influence of an electric current. The frame may be of magnetized steel and have wings to act like pole plates, or it may be of soft iron and coiled with a wire carrying an electric current from a battery worn on the person so as to be thereby temporarily magnetized. When the electric current is to be utilized directly, the wings have sliding adjustable insulating pieces carrying the poles of a voltaic battery. A "permanent dry battery" is preferably used.

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

5449. Boulton, A. J., [*Goetze, C. C.*] Nov. 19.

[*Provisional protection only.*]

Levels.—Consists of two level glasses connected by a tube filled with liquid and fixed in two sleeves attached to bars, which may be folded up by means of hinges. A centre-piece connects the bars and

rotates on a vertical pivot at the top of a rod. A nut screws upon the pivot and fixes the level in position. A simple tripod stand is described to which the instrument may be attached when in use.

5591. Stevenson, J. C. Nov. 30.

[Provisional protection only.]

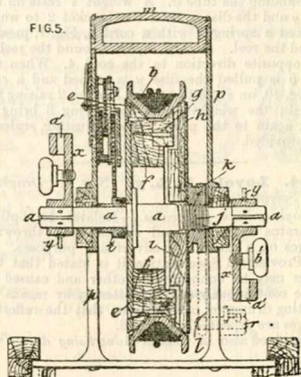
Specific-gravity indicator for casks. Two floats are used, one to indicate the quantity, and a long one that works through this to indicate the specific gravity. The cord of each float is attached to a pulley so that as the level of the liquid sinks the hands revolve in front of a dial face, much like the hands of a clock. If the specific gravity of the liquid changes, the relative positions of the two hands also changes. To allow for the bulging of the cask, the pulleys may also bulge, or the dial may be divided to allow for the bulging while the pulleys are cylindrical.

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

5675. Thomson, Sir W. Dec. 8.

Sounding apparatus.—Relates to the inventions described in Specifications No. 3452, A.D. 1876, and No. 781, A.D. 1880. The apparatus is shown in transverse section in Fig. 5. The wire drum or wheel *b* is preferably constructed of a grooved ring, which is carried by a disc *e* secured to the shaft *a*. To the inner face of *e* is attached a ring *f* of wood, with blocks *g* of some harder wood, as lignum vite, inserted. The drum is free to rotate in the groove formed by the ring *f* and the blocks *g*. Upon the axle is loosely inserted a disc *h* of iron &c. to the inner face of which is secured a disc of wood *i*. A nut *k* working on the shaft *a* has an arm *l* which, by means of a bolt *r* passing through a hole in the support *p*, can be fixed in position. A pinion *t*, loose on the shaft *a* but connected to the rim of the wire wheel *b*, actuates a counting-apparatus for ascertaining the approximate depth. The hauling-in arms *x* are provided with collars *a'* into which an

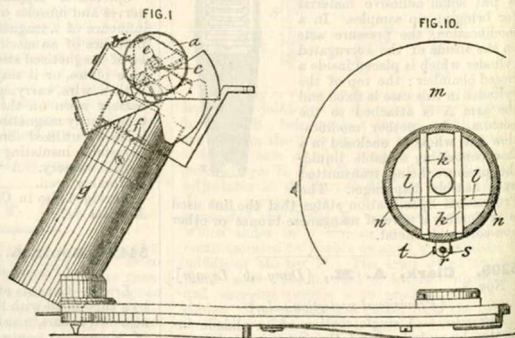
additional length of arm carrying the handle can be slipped and clamped. The machine when not in use is immersed under lime water contained in a



tank forming the stand. During the descent of the sinker the wheel *b* rotates freely. In hauling in, a few turns of the handle force the disc *h* in contact with the disc *e* and drum *b*, frictionally gearing the latter with the shaft *a*. The depth gauge consists of a glass-tube, open at one end, and coated on the interior with a solution of aniline blue; it is enclosed in a metal case open at the end and closed at the other by a cap, the whole being lashed to the sounding line. The water rises in the gauge tube and washes off the colour, and from the distance so marked the depth of the water may be obtained. The glass gauge glasses after being coated with aniline blue are dried by being placed in a metal tube surrounded by a hot-water jacket, the metal tube being in communication with an aspirator.

5676. Thomson, Sir W. Dec. 8.

Compasses, magnetic.—In place of an azimuth mirror a totally reflecting prism *a*, Fig. 1, is employed, mounted in a frame *b* which is supported in bearings *c* secured to the body of the instrument. The shaft to which the frame is attached is pressed into its bearings by a spring *e*. By this means bearings may be taken viewing the object directly, or by reflection in the prism. A lens (shown in dotted lines at *f*), which is not concentric with the tube *g*, facilitates the adjustment of the instrument. The



instrument may be arranged to admit of the use of two lenses differing in focal length for use in bearings of celestial objects or objects on the horizon. Each degree on the card has its number inverted so that the figure will be seen correctly when using the azimuth mirror, while large figures (written direct) mark the divisions for use in steering. For correcting, two vertical rows of fore and aft magnets *k*, Fig. 10, are used, one on each side of the centre of the binnacle *m*, and alternating with these a single row of thwart-ship magnets *l*. A revolving metal shutter *n* closes in the magnets and is secured by means of a rod *s* passing through staples *r* and fastened by a padlock *t*, or any other suitable means of fastening may be employed. An additional receptacle is employed for holding quicklime for the purpose of keeping the air inside dry.

5717. Clark, A. M., [McKenna, T., and Carley, H.]. Dec. 14.

Alarm thermometer.—Applicable as a low-water alarm for steam boilers &c. or as a temperature alarm for ovens, furnaces, &c. The invention is described with reference to a boiler. The thermometer bulb *a* is surrounded by a casing *B* communicating with the contents of the boiler. When the water in the boiler sinks sufficiently to permit the entrance of steam into the casing, the mercury expands and makes contact with a wire *E*, completing an electric circuit and sounding an alarm as shown. The upper part of the thermometer tube is enlarged to prevent overflow of mercury. The wire *E* has an insulating casing *c* which is screw-threaded so that the wire may be adjusted to make contact at the desired temperature, as indicated on a scale *G*, by turning a nut *f*. The tube *D* has a screw plug *k* for cutting off communication with the alarm, and a cock.

Abridged also in Classes *Fire, Extinction &c. of ; Steam generators.*

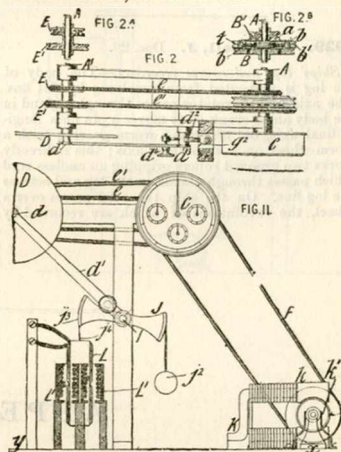
5765. Blamires, T. H. Dec. 17.

[Provisional protection only.]

Temperature &c., indicating and registering.—The apparatus is employed to register the temperature and pressure in connection with steam engines, to calculate horse-power, &c., or with steam boilers. Drums carrying sensitized paper are enclosed in a covering or dark chamber and made to revolve by clockwork &c. The shadow of the fingers of a pressure gauge or of the mercurial column of a thermometer is made to fall on the prepared paper, through a slit in the cover, in this way making a record of the variations in temperature and pressure. The instruments are supplied with steam by inlet and outlet pipes operated automatically by clockwork. Or the record may be a continuous one. The pressure gauge may be arranged to record its variations by a pencil instead of photography.

Abridged also in Class *Registering &c.*

5909. Meeze, A. G. Dec. 29.



Anemometers.—Relates to apparatus for integrating the wind force. Two sets of cups may be used of different powers, working differentially, or a single set. The main shaft *A* is connected by suitable gearing with a counter *c* to record the number of revolutions made by it. Upon that shaft is keyed a spur-wheel *a*, upon each side of which run loose pulleys *B, B'*. Made in one with the pulley *B'* is a pulley *b'* which carries an internally-toothed ring within it. The pulley *B* carries two studs upon which run pinions *b, b'* gearing with both the wheels *a* on the shaft *A* and the internal teeth of the pulley *b'*, thus forming an epicyclic train. If now the pulley *B'* is held and *B* turned, the shaft *A* will revolve in the same direction, but not at the same speed, as the pulley *B*, but if *B* be held and *B'* turned the shaft will revolve in a retrograde direction. The pulleys may be driven at such speeds as shall keep the shaft *A* motionless. On a second shaft *A'* are fixed two pulleys *E, E'*, the former geared to the pulley *B'* by an elastic extensible band *e* (preferably a metallic wire spring). The other belt *e'* from the pulley *E'* to *B* may be extensible or not. The pulleys and wheels are so proportioned that when driven by a belt on *b'* the main axle *A* is at rest. On the shaft *A'* is a disc *D*, against which presses a friction piece *d* carried by a spring lever *d'* carried on an axis *d''*, on

the other side of which axis is a segment d^2 working in a rack g^2 . The friction of the piece d on the disc D retards the shaft A^1 in proportion to its distance from the centre of the disc. Thus by the lengthening of the extensible belt the relative speed of the pulleys B and B^1 is varied and the main shaft A revolves. Its number of revolutions (which is the integral sought) is recorded by the counter.

Abridged also in Classes *Electricity &c.*, *Div. III.*; *Hydraulic machinery &c.*; *Registering &c.*; *Rotary engines &c.*

5929. Campbell, J. Dec. 29.

Ships' logs and course recorders.—The body of the log is prevented from revolving by flat fins. The axis of the rotator passes through a gland in the body and a crank on it moves a pin on a longitudinal axis, on which is a worm gearing with a worm-wheel on a transverse axis; this indirectly works two grooved rollers gripping an endless cord which passes through glands in the log and acts as the log line. On the ship the cord passes over a wheel, the revolutions of which are recorded by

counting-wheels. Beneath the axis of the wheel is a pivoted circular table with a magnetic needle and supported on gimbals; on the table is held a movable sheet of paper. A disc on the axis of the wheel has a pin on it which raises a cradle with the circular table every revolution, bringing the paper in contact with a pointed wheel supported on a cross-bar over the centre of the table; the paper is thus marked and at the same time moved forward by the simultaneous moving of the pointed wheel.

5985. Boulton, A. J., [Schulz, G. R.]. Dec. 31.

[Provisional protection only.]

Ellipsograph.—Parts of the instrument may be used as a rule, compasses, or parallel rule. A bar, which may consist of two parts joined together to form a parallel rule, has on it three sliding trammel heads, one with a pen &c.; two of these trammel heads are guided in grooves, which cross one another, in a plate fixed by screws. The other end of the bar carrying the pen will then describe an elliptic curve. The trammel heads are removed from the bar for the latter to be used as a rule.

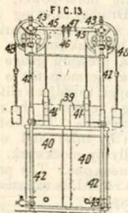
APPENDIX.

A.D. 1878.

755. Peebles, D. B. Feb. 23.

Apparatus for testing gas by rate of efflux.—The twin gas holders 39, Fig. 13, with gauges 41, are connected by outlet pipes 42 with burners 43 having platinum-tipped or other suitable orifices. The burner stop-cocks are opened simultaneously by tubes 45 fixed to their plugs, having handles 46 which can be interlocked by a sliding-bolt 47. The apparatus is adjusted by filling both holders with air and loading equally, then equalizing the orifices so that they discharge at the same rate. For testing, one holder is filled with air and the other with illuminating or other gas, and the comparative rate of efflux noted, by which the density or quality is indicated.

Abridged also in Classes *Gas distribution*; *Valves &c.*

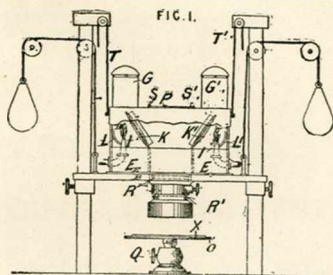


A.D. 1878.

3010. Johnson, J. H., [Hall, T.]. July 29.

Camera lucida.—Relates to apparatus for copying and enlarging designs for printing on calicoes &c., the design being reproduced on the plate ready for engraving. The apparatus consists of a camera composed of two boxes E and F; the lower one E is fixed, and provided with levers R, R' and burners I, I' fitted with condensers K, K', on an adjustable platform B. The upper part F is movable by means of cords T, T', and is furnished with chimneys G and springs S, S' for holding the opaque design to be reproduced. Light from the burners is condensed on to the design P, an image of which is thrown by the lens R on the plate X to be engraved, which is coated with flake white to make the pencil marks legible. To vary the size of the design reproduced the upper part F of the camera may be moved, or the platform B may be adjusted by means of cords D, or the table O, which the plate X is fixed, may be adjusted by a screw Q.

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



A.D. 1883.

693. Lowe, F. Feb. 8. *Drawings to Specification.*

Roads &c., determining gradients of.—The instrument is based on the relation $dr = \cos \phi ds$ existing at any point of a curve. Two equal sized wheels are arranged slightly tandem and so that the bar joining their axles is parallel to the slope of the road at any instant. This "tangent bar" is connected to a rod which is kept vertical by a special inertia pendulum and which at its upper end, or "pole," carries a "radius bar" passing through a fixed guide on the tangent bar. On the radius bar is a pencil or style fitted in a slider which moves up and down the bar by means of a cam attached to the pendulum bar and by disc and cone mechanism. Behind the pencil is a sheet of paper &c. stretched over two rollers which are rotated at a speed proportional to that of the instrument by means of gearing connected to one of the running wheels.

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