tackle is to be hove in, another clutch lever may take the outer cylinder, or the reel may be made in one piece having a spring box *e* fitted thereto to take the clutching-lever.

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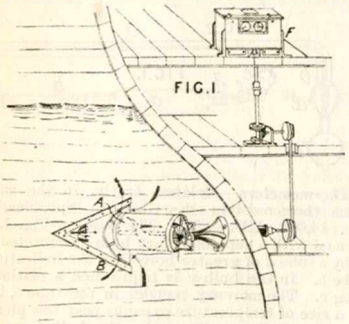
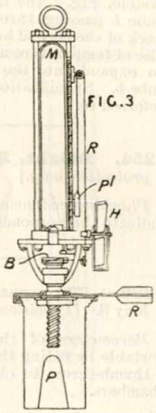
937. Rebour, G. April 3.



Logs and current meters; sounding-apparatus.—The log consists of a screw A, or water-wheel, mounted in a casing protected in front by a conical shield B. The motion is transmitted by spur and bevel gearing to indicating-apparatus F. This may include a gong, struck at intervals, and autographic apparatus in which a strip of paper upon which a record is made is unwound from one spring cylinder on to another by clock work. To indicate an under current, its depth and direction, the auxiliary sounding-apparatus, Fig. 3, is employed. A tube M, closed at the top, for indicating the depth by air-compression, is mounted upon a plate with a horizontal screw or fan H, the lower half of which is shielded. To the axis of this screw is attached a cord R which passes over a pulley P and is attached to a weight P^1. The sounding-lead P is fitted with a projecting blade R and a compass B. When the apparatus is lowered into an under-current, the blade R is acted upon to set the apparatus in a certain direction; the screw H winds up the weight P^1, and the needle of the compass is locked in its position. Simultaneously, water enters the tube M to indicate the depth in the usual way. Thus, in one operation, the apparatus indicates (1) the existence of a current by the rising of the weight P^1; (2) the depth at which it occurs; (3) its direction. The current meter first described can then be lowered to determine the strength of the current.



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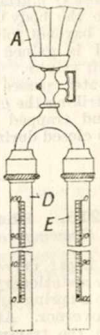
961. Hale, A. J. April 4. [*Provisional protection only.*]

Ellipsographs.—A compass leg *a* is fitted with a tubular part *b* and with an arm *c* pivoted at *e* and carrying the pencil leg *g*. An extension *f* of the arm *c* is pressed by a spring *n* against the edge of an oval cam *k* on the tube *b*; the other end of the arm *c* is adjustable in a quadrant *h* on the leg *g*, which latter is connected by a link *m* to the leg *a*.

1106. Marsden, W. J. April 16. [*Provisional protection only.*]

Eye-shades.—An eye-shade is made of silk, cotton, alpaca, gossamer, muslin, linen, hair, bristles, &c., fastened on a framework of gold, silver, or steel wire, whalebone, cane, ivory, or bone. The frame fits the forehead at one edge, and projects from it. The extremities of the frame are attached by vertical hinges to the ear pieces, which have a horizontal hinge.

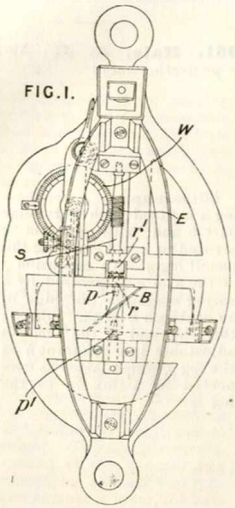
1177. Moir, W. April 23.

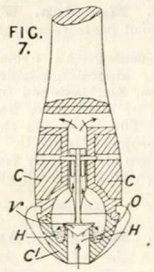


Specific-gravity estimating-apparatus.—A pair of tubes D, E, graduated in opposite directions, are exhausted by a ball A so as cause water to ascend in one tube and the liquid to be tested in the other.

1185. Johnson, J. H., [*Trowbridge, W.*]. April 23.

Logs; sounding-apparatus.— A helically-bladed screw B is mounted on pivots *p*, p^1, upon which it rises during descent for sounding purposes and thus, by a clutch *r*, r^1, becomes engaged with the registering-mechanism. The registering-mechanism is driven by a worm E on the shaft S which engages with a spur-wheel W. A worm on the shaft of the wheel W gears simultaneously with a pair of parallel wheels, one of which has one tooth more than the other. Index pointers on these wheels indicate by their separation the revolutions of the screw B and hence the depth. The wheel W can be thrown out of gear to set the hands. During ascent, the screw B rotates but does not drive the registering-mechanism. Fig. 7 is a section of a sinker for collecting specimens. A nose C^1 is attached to the body C by a bayonet joint. Access to an annular chamber H is gained by an opening O guarded by a lift valve *v*. During descent, the valve rises and water passes as indicated by arrows. Upon striking the ground, some material is forced into and trapped in the chamber H. The valve H is closed during ascent.

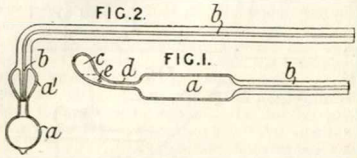




1215. Shaw, J., [*Shaw, J.*]. April 25. *Drawings to Specification.*

Logs; current indicators.—A towed ship's log or a stationary float in a current may be attached to a spring or act as the load on a centrifugal governor. An index finger or a style is attached to the transmitting-mechanism of the governor or the float or log line, and indicates on a dial or registers on a travelling sheet the speed of the ship or current. A heavy log is used to keep it below the action of the waves.

1223. Negretti, E. A. L., and **Zambra, J. W.** April 25.



Thermometers.—Relates, firstly, to the minimum thermometers described in Specification No. 14,002, A.D. 1852. The bulb *a*, Fig. 1, is formed with a supplementary bulb *c* connected to it by a tube *d* of greater bore than the indicating-tube *b*. In the bulb *c* is imprisoned a platinum plug *e*. The mercury recedes in the tube *b*, but on a rise of temperature expands past the plug *e* into the bulb *c*. Secondly, the bulb is made double, Fig. 2, the inner end of the registering-tube *b* passing through the first bulb a^1 to the neck of the second bulb *a*. As in the first case, a rise of temperature after a fall causes the mercury to expand into the bulb a^1 instead of into the tube *b*. Specification No. 2316, A.D. 1855, is also referred to.

1254. Bright, R. April 29. [*Provisional protection only.*]

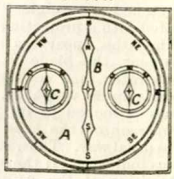
Plumbing-instruments.—A plumb line is used to indicate the perpendicularity of an oil lamp.

1386. Thompson, N., [*Dorwin, J. H.*]. May 8. [*Provisional protection only.*]

Barometers of the siphon type are made portable by fitting them with a valve, operated by a thumb-screw, to close the end of the mercury chambers.

1405. Moore, R. May 10.

Compasses, magnetic.—Relates to a compass for steering or laying a ship's course and also for correcting the magnetic variations of such indicators. The instrument, shown in plan in Fig. 4, consists of a graduated card A which revolves on a pivot or is suspended so as to rotate freely on its axis, or floats



in any suitable medium, a directing-magnet B, which is attached to the card, and auxiliary magnets C which rotate independently. Normally the magnets C lie parallel to the magnet B, but when under any abnormal magnetic influence they deviate from this position. From the readings of the small magnets, the true magnetic north can be ascertained. When the card A floats on a liquid, it is rendered buoyant by a tubular aluminium ring.

1516. Morris, T., Weare, R., and Monckton, E. H. C. May 19.

Colours, comparing.—The light obtained from suitably-excited vacuum tubes, regulated by filling the tubes before exhaustion with various gases, and by means of lenses, reflectors, and ground or coloured glass, is used "to enable "painters to distinguish between different sorts "of color by night."

1528. Petrie, W. May 20.

Thermometers; specific-gravity estimating-apparatus.—In an apparatus for boiling or rectifying sulphuric acid and other chemicals, the temperature, degree of concentration, and specific gravity of the liquid are indicated by the pointer R of the thermometer shown. The spindle Q of the pointer passes through a hollow stem P, is supported by the bottom T of a wire cage U, and is operated by a helix O composed of two or more laminæ of alloys having different coefficients of expansion. Alloys containing platinum, gold, silver, and copper may be used. A glass or platinium case V contracted at Z is preferably used.

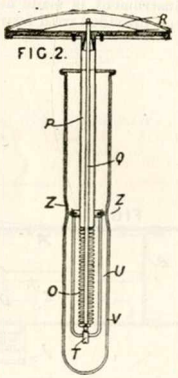


FIG. 2.

1611. Hirst, J., and Wood, J. May 29.

Stereoscopes.—To make the grain of stereographs less obtrusive under magnification, the light by which they are seen is first passed through coloured screens. In the arrangement shown in Fig. 2, the stereographs *c* are placed in a frame which, for focussing purposes, is adjusted by a rack d^1 and pinion e^1. For use with light reflected by a mirror *h*, a transparent and flexible coloured screen *g* is wound upon

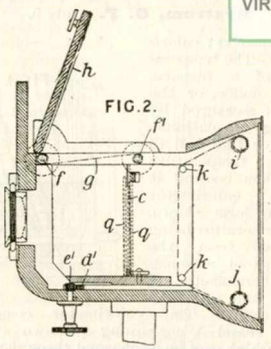


FIG. 2.

rollers *f*, f^1. For transparencies, the screen is continued to the back of the apparatus over rollers *k*, *i*, *j*. Effect slides *q* may be used with an illuminating-lamp.

1778. Lanoa, F. M. June 16. [*Provisional protection only.*]

Surveying-instruments. — An instrument to "combine in one all the instruments now used "in surveying," consists of a combination of two telescopes with an alidade level and graduated circle together with mechanical arrangements for adjusting the apparatus at different inclinations.

1792. Turner, M., and Loseby, E. T. June 17. [*Provisional protection only.*]

Telemeters.—A telescopic sight for ordnance and small-arms has a serrated band extending across the eye-piece, so that the distance of an object of known size can be inferred from the number of teeth covering the object. The whole is adjustable in a removable frame, and is placed at the side of the gun, so as not to interfere with the usual sights.

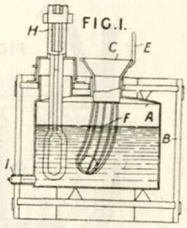
1944. Russell, S. July 4. [*Provisional protection only.*]

Stereoscopes.—The pictures are placed immediately above, the eye-pieces, and are viewed by reflection from a mirror arranged opposite to them. Tinted glasses may be employed.

1951. Byström, O. F. July 5.

Pyrometers; calorimeters.—The temperature of a furnace, retort, muffle, or the like is measured by heating a platinum, steel, or like ball to the high temperature and then cooling it in a calorimeter of the form shown, the temperature being derived from the readings of a sensitive thermometer H before and after the experiment. The calorimeter comprises a closed vessel A containing a known weight of water which may be discharged through a passage closed by a plug I. The ball passes through a funnel C into a wire cage F which may be rotated by a handle E. A wood or like casing B is provided to prevent radiation. The ball is introduced into the furnace &c. through a tube, which may have a plumbago crucible at the end, and the ball has an aperture to receive the end of the supporting-rod, or this rod has a cup-shaped end to support the ball, which is discharged through a second tube having a self-closing valve at the bottom.

FIG.1.



1988. Ponti, J., [*Ponti, C.*]. July 10. [*Provisional protection only.*]

Graphoscopes.—A single lens, large enough for binocular use, is mounted with a shade for the examination of photographs. Reflectors are fitted for use with either opaque or transparent object slides. Photographs may be printed on translucent paper so that they can be examined either by reflected or transmitted light. A sheet of coloured transparent paper may be used for tinting purposes.

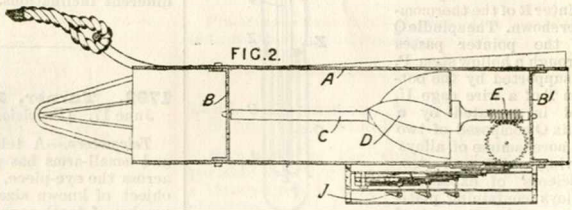
2177. List, J. Aug. 1. [*Provisional protection only.*]

Surveying-instruments.—A folding instrument is made in the form of a square, one side being provided with a pair of fore sights and the opposite side with a sliding piece with a back-sight. The sliding piece, and the upper and lower parts of the side in which it slides, are graduated, the instrument being thus used without calculation for giving "heights and distances and distances "between objects"; it is also used for solving trigonometrical problems. For use on vessels, the instrument is made as a drawing-board or table top provided with bearings for a telescope.

2280. Walker, A. Aug. 14.

Logs; sounding-apparatus.—A propeller D is mounted in an open-ended tube A between cross-bars B, B¹. A worm E on the shaft C drives, through spur gearing, the indicating-hands *j*. In a modification, adapted for sounding purposes, a weight is cast on the outside of the tube A and one end of this tube is fitted with a flap which opens during the descent of the apparatus but closes on ascent.

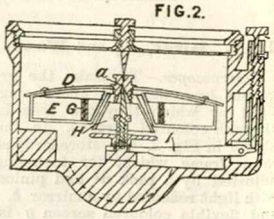
FIG.2.



2345. Ritchie, E. S. Aug. 22.

Compasses, magnetic.—In liquid compasses, the magnet is buoyed up by an air vessel so as to take nearly all its weight off the pivot. Beneath the compass card D is fixed an annular air chamber E in which the magnets G are arranged. The chamber is connected to the cap *a* by screwing up the protecting-cone H. An elevating disc and lever I serve to lift the card off the central pivot.

FIG.2.



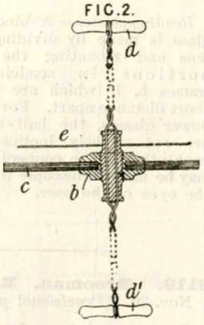
2611. Alexander, R. Sept. 25. [*Provisional protection only.*]

Compasses, magnetic.—Local attraction is neutralized either by a number of magnetic poles or by a magnetic ring arranged upon the compass card. The various parts of the compass apparatus, as the cards, bowls, hoods, binnacles, &c., may be made of iron.

2643. Hirsh, H. Sept. 29.

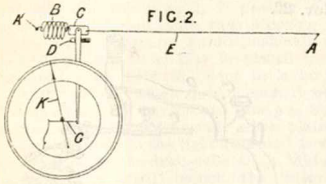
Chromatropes. — A number of coloured discs c are mounted on a boss *b* which can be rotated alternately in opposite directions by the twisting and untwisting of a pair of cords operated by pulling and then releasing the handles *d*, d^1. Each disc c is slit radially so that a number can be overlapped to produce a disc made up of differently-coloured sectors. A disc *e* of various shapes, which may be relatively retarded during spinning by the air resistance against projecting pieces, is employed to vary the pattern continuously.

FIG. 2.



2822. Hall, N. R., and **Parnell, M. L.** Oct. 20.

FIG. 2.

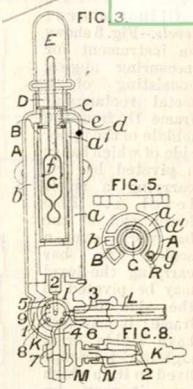


Thermometers.—A stretched wire E is fixed at one end A, and connected by a spiral spring B to a second fixed point A^1. Near the spring is fitted a plate C fastened to a pivoted lever D, the lower end of which is fixed to a cord passing around a roller G on the axle of a pointer K. This pointer indicates the alteration of length of the wire E due to changes of temperature.

2852. Gamble, W. S. Oct. 23.

Specific-gravity estimating - apparatus. — Relates to a salinometer the scale of which is read off from the bulb of the hydrometer instead of from the surface of the water. The metal cylinder A is formed with a chamber *a* and a passage *b*; a glass tube B fits water-tight in the part a^1 by means of washers *d* of suitable material. The metal washer D for guiding the stem of the hydrometer is screwed closely by the cap E to the metal gland C, which is formed with the openings *e*. The hydrometer G, which is placed loosely in the tube B, is provided with a coloured belt *f*, or with points around its bulb, which are employed to read off the indications on the scale engraved at the margin of the longitudinal slit of the case A. The passage 1 of the casing of the three-way cock I comes opposite the passage *b*, and the casing is kept in that position by the set-screw 5. The other passages 2, 3, 4 connect the cock with the case A, the union L leading to the steam boiler and the waste pipe M. The plug K of the cock, shown separately in Fig. 8, is fitted with a water-tight adjusting-screw N for regulating the quantity of water admitted into the salinometer; it is also fitted with a handle and indicating-dial for showing the relative positions of the cross passages of the plug and the casing I. Communication between the boiler and the waste pipe M is obtained by bringing the passages 7, 8 of the plug opposite the passages 3, 4 of the casing I; the salinometer is placed in communication with the waste pipe by bringing the passages 7, 9 opposite the passages 2, 4. The thermometer R is enclosed in a tube of vulcanized india-rubber and inserted into the hole *g*, Fig. 5. A brass tube fits into the hole *g* and around the upper part of the thermometer, and is made water-tight at the bottom on a seat formed in the hole. The indications of the thermometer are observed through a slit cut in the case A.

FIG. 3.



2912. Clark, W., [*Pradel, P.*]. Oct. 29. *Drawings to Specification.*

Anemometers ; surveying - instruments. — Apparatus having a travelling chronographic band for ascertaining and recording the speed of and distance travelled by vehicles, and for other purposes, is stated to be applicable for indicating the force of wind, according to the direction of movement of a ship, and for surveying or measuring ground, giving the angles of deviation from a straight line.

2976. Lefebvre, J. Nov. 4.

Clinometers; levels.—Fig. 8 shows an instrument for measuring angles, consisting of a metal rectangular frame D from the middle of the upper side of which hangs a pivoted bar F^1, carrying a spirit level A. The lower end of the bar works over a scale. The bar carrying the level may be pivoted to the side of the frame; it may also have sights or a sighting-telescope fixed to it, in which case it may be adjusted by a rack and pinion. Fig 12 shows a modification adapted for levelling. The frame is mounted on a bar Q, carried by a tripod, and works over a horizontal circle. Different scales may be fitted.

FIG.8

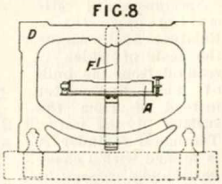
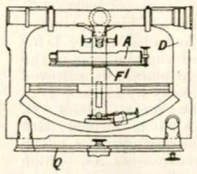


FIG.12



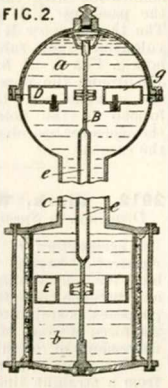
2980. Logan, T. Nov. 4. [*Provisional protection only.*]

Kaleidoscopes.—The instrument is mounted on a stand, with the eye-piece upwards, so as to be capable of revolving on its axis; a circular reflector is attached to the stand and is mounted on pivots so as to reflect the light into the kaleidoscope. The stand has two pillars near the upper end of which is fixed a ring, in which the tube of the kaleidoscope is mounted.

3061. Ritchie, E. S. Nov. 13.

Compasses, magnetic.—To remove the magnet from the disturbing influence of the iron of the ship, it is mounted so that, whilst itself raised, the indicating-card is at a lower level. Vessels *a*, *b* connected by a tube *c* are filled up with liquid. A vertical spindle B, made hollow at *e* to relieve the pressure on the lower bearing, has attached to its upper end, by gimbals, a hollow ring D to which the compass magnets *g* are attached. To the lower end of the spindle a similar ring E is attached, carrying the compass card, which may be observed through the glass sides of the vessel *b*.

FIG.2.



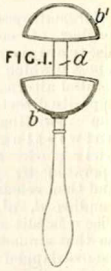
3071. Cassaignes, V. J. Nov. 14. [*Provisional protection only.*]

Stereoscopes. — Parti-tinted glasses &c. are introduced between the eyes of the observer and the stereographs.

3101. Beck, R. Nov. 18.

Reading-glasses.—A binocular glass is made by dividing the lens and mounting the two portions in semicircular frames *b*, b^1 which are set a short distance apart. For high-power glasses, the half-lenses are set slightly inclined to each other. The connection *d* may be made telescopic to suit the eyes of the user.

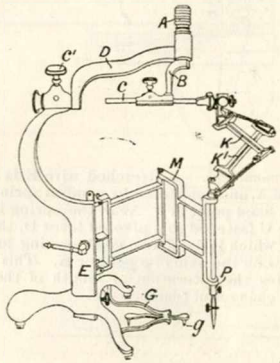
FIG.1.



3119. Brooman, R. A., [*Corradi, J.*]. Nov. 20. [*Provisional protection only.*]

Course recorders.—Under a ship's compass passes, horizontally, sensitized paper moved by the turning of two rollers, one on each side of the binnacle. Upon the disc of the compass is a small object which throws a point of light from a natural or artificial source upon the moving paper, leaving a photographic record. The rollers are actuated by clockwork.

3140. Gedge, W. E., [*Carmien, P. J.*]. Nov. 22.



Ellipsographs.—An adjustable rod c slides in a holder B, which can be rotated about an axis at right-angles to the rod c by a knob A. As the knob A is rotated, therefore, the end of the rod c describes a circle of adjustable radius. The plane in which this circle is described can be adjusted by tilting the arm D about a horizontal axis and locking it with a set-screw c^1. The pen P is connected by pivoted frames M to the standard E and by links K, K^1 to the end of the rod c. As the end of the latter describes a circle, then, the pen, in following it vertically, in general describes an ellipse. Pointers *g* are set on the line about which an ellipse is required.

3247. Eden, A. F. Dec. 3.

FIG.1.

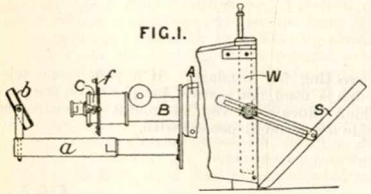
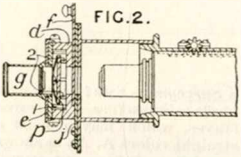


FIG.2.

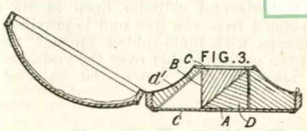


Microscopes.—Relates to apparatus for producing micro-photographs of large objects and large photographs of microscopic objects. The camera box A has a dark slide W, with adjustable reflector S, and at the other end a draw-tube B containing a microscope object-glass, the position of which is adjustable, with a removable box C on the end of tube. A brass plate *j*, Fig. 2, is held removably in dovetails on the end of the tube, and behind this are a sliding shutter *f* for the central aperture, the pins 1, 2 passing right through into the brass plate, thus securing the box *d* thereto and forming guides and supports for the glass plate *p*, which may be placed in the box and is further held in place by a hinged door *e* with springs which press upon it when the door is closed. A microscope tube *g* is fitted to the door, either for viewing the glass plate or for condensing thereon the light reflected from a mirror *b* carried by the draw-tube *a*. In taking a photograph of a small object, the latter is mounted on the plate glass *p*, and its image is focussed by the main lens upon a screen at the distant end of the camera, after which a photographic plate is substituted and exposure given.

3249. Swan, H. Dec. 4.

Stereoscopes.—A parallelopiped of glass is built up of two prisms C, D. The two parts of a stereograph are secured respectively to the faces A, B. The first of these is seen directly and the second by reflection in the internal diagonal face. The base of the instrument may

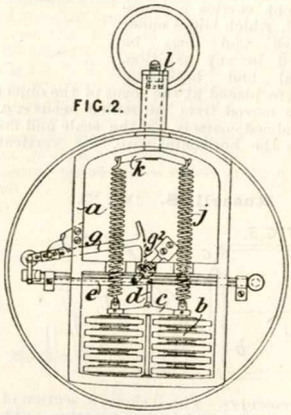
FIG.3.



be of white glass *c*; a reflector d^1 may be used for the picture on B. Magnification may be secured by making the prism faces convex.

3264. Blackwell, T. E. Dec. 5.

FIG.2.



Barometers, aneroid. A pair of vacuum chambers *b* are mounted on a frame *a* and connected by a cross-bar *c* and link *d* to a lever *e*. This lever, through a second lever *g* carrying a toothed quadrant g^2, drives the index. The chambers *b* are connected by springs *j* to a cross-bar *k* which can be adjusted vertically by a nut *l* to determine the range of the instrument. In a modification, the pressure on the chamber is balanced at every reading by the tension on a spring. The length of the spring, when this adjustment has been effected, is read off against a scale marked to indicate the pressure.

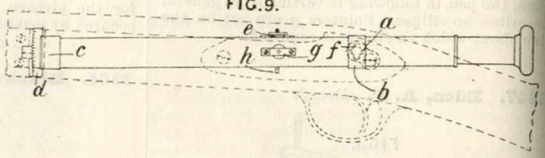
3362. Wallich, G. C. Dec. 24. [*Provisional protection only.*]

Sounding-apparatus.—To ascertain the pressure, and thereby the depth, in sounding, a cylinder is fitted with a water-tight piston and a strong bottom, and is filled with an easily-compressible substance such as india-rubber and a nearly-incompressible liquid such as mercury. When the apparatus is lowered, the pressure on the india-rubber, which is uniformly distributed by the mercury, compresses it, the extent of com-

pression being recorded by a pointer connected to the piston-rod. To collect samples of the water, a horizontal cylinder, open at its ends, is suspended from the line and is provided with closing-caps with india-rubber springs tending to pull the caps together over the ends, the caps being normally held above the axis of the cylinder. A weight is allowed to slide down the line, strikes the bars connected to the two caps, and pushes the caps down till they are opposite the ends of the cylinder, and are pulled over them by the springs; a hole in the cylinder allows escape of water, and as the caps come together they pull a slide over this hole.

3399. Davidson, D. Dec. 19.

FIG.9.



Telescopes for sighting guns. The telescope is pivoted to the gun by a lug *a* attached to the sleeve *b* and passing through the slot *f*. The sleeve *c* at the front carries a range scale *d*, which slides under a mark and may be clamped in any position. Vertical and horizontal wires are placed at the focus of the object glass and are moved from the milled heads *e*, *g*. The gun is aimed coarsely by the scale and finely by moving the horizontal wire, the vertical wire correcting for windage. If a wide-range telescope is used, and a scale be placed on the pin *f* which slides with the horizontal cross-wire, the scale *d* may be dispensed with.

3429. Russell, S. Dec. 23.

FIG.3.

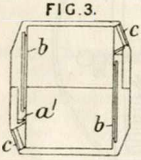
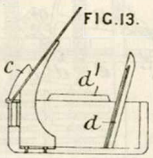


FIG.13.



Stereoscopes.—Fig. 3 shows a section of a pair of instruments which close together, as shown, to form a slide box. When the lower half, for instance, is in use, the stereograph is allowed to rest upon a ledge a^1. It is observed through a pair of eyepieces *c* in a mirror *b*. Fig. 13 shows a modification, in which a part *d* of the lid, which slides in guides d^1, carries on its underside the mirror in which the stereograph, held by a hinged part *c* of the lid, is seen. In another modification, the instrument is fitted with a bail and handle for hand use. The mirror may be folded down on to the bottom of the box.

3432. Birkbeck, G. H., [*Leroyer, G. A.*]. Dec. 24.

FIG.4.

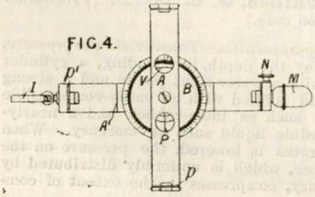
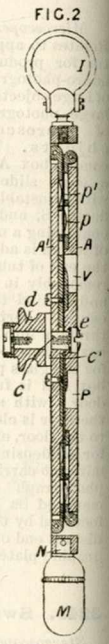


FIG.2



Surveying - instruments; levels; clinometers.—Two cross-staves, which may consist of straight rulers A, A^1, as shown, or of two halves cut from a disc, are centrally pivoted so as to permit relative motion and are provided with hinged sights *p*, p^1, and a graduated circle B is fixed to the ruler A^1. Apertures P, V in the ruler A allow the scale on the circle B to be read. When used as a level, the instrument is hung by the ring I and is adjusted by moving the weight M transversely by turning the screw N. The instrument is held together by a screw *e* working in the axis C and bearing against the washer C^1, on which stands a screwed boss *d*, which may be mounted on a stand. The instrument may be used as a square or as a "graphometer."

3434. Gisborne, F. N. Dec. 24. [*Provisional protection only.*]

Logs.—The rotator drives an armature arranged in proximity to "electromagnets attached to a "permanent magnet"; the currents generated are conveyed to a step-by-step indicator. Or the rotator may make and break a galvanic current.

3454. Loseby, E. T. Dec. 26.

Barometers, aneroid. The movements of the vacuum chamber are measured by means of a micrometer screw, the end of which bears upon a pivoted "drop piece" interposed between the screw and the stud on the vacuum chamber. The screw, which is fitted with an indicating-hand, is turned until the drop piece is released; the threads of the screw are specially formed, the sides which resist the thrust being cut at right-angles to the axis. The vacuum chamber is made of steel, and is hermetically closed without any ealing tube projecting from it; the top and sottom are made convex. When a spring is used, it is in the form of a flat elliptical band surrounding the vacuum chamber. In a modification, the pressure is indicated by attaching to the vacuum chamber a rack which engages with a pinion connected by a train of wheels to an index hand. The dials may be graduated for altitudes alone, and for extended ranges the scale is spiral or concentric, with a small index dial, visible through the main dial, for indicating which scale is to be read. In mercurial barometers, the scale is graduated so as to allow for the differences in level of the mercury in the cistern.

Anemometers.—The apparatus consists of a pivoted lever having a disc at one end and a counterweight at the other. A spring is coiled round and attached to the axis of the lever, the free end being fixed to a dial which is "turned "round to wind up the spring until its strength "balances the force of the wind impinging "on the disc." In another arrangement, an inflated air ball is attached to a cord wound round a spring drum, the amount of rotation of which is indicated by a pointer.

Wind vanes.—The case of the above anemometer may be fitted with a socket and pivot, so that it can set itself to the wind, the direction of which is indicated by an attached compass.

A.D. 1863.

102. Boyle, T. Jan. 13. [*Provisional protection only.*]

Kaleidoscopes.—A tapering wooden box is fitted internally with glass reflectors, either flat or curved, to magnify, minify, or distort any object viewed.

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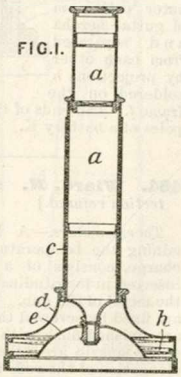
141. Newton, W. E., [*Rappard, C. von*]. Jan. 15.

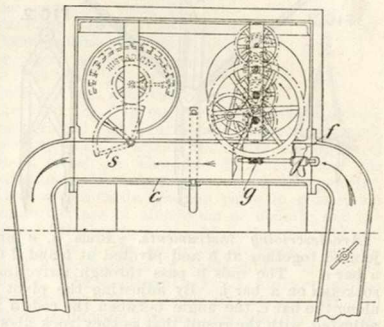
FIG. 1.



Microscopes for hand use. The body *a* is slid into a tube *c* carried by a circular foot *d*, within which a reflector *e* is pressed down by a spring *h* to clip the slide. As a finder, a glass slip is employed, ruled with a small circle which can be adjusted to enclose any minute object on a second slide.

187. Bazin, E. Jan. 21

FIG. 1. *(Sht 2)*



Logs.—The ship is fitted with an inverted U-shaped tube the lower ends of which are below the water level, at the same level, and pointing ahead and astern respectively. The bend of the tube *c*, which is above the water, is, as is shown by Fig. 1, fitted with indicating-apparatus operated by the stream which passes through the tube, when the ship is in motion. A hinged flap *s* is raised more or less by the force of the stream, and indicates

the speed of the ship through suitable gearing. The distance is indicated by means of a screw *f* driving indicating-mechanism through a worm *g*. A pump is employed to prime the U-tube at starting.

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211. Clark, W., [*Fabre, G.*]. Jan. 23. *Drawings to Specification.* [*Provisional protection only.*]

Compasses, magnetic.—To compensate for and ascertain the deviation of a ship's compass, and to ascertain the direction of the magnetism influencing it, electric circuits are placed east and west of the needle and are supported by light cross-pieces. The ends of the circuits dip into mercury cups connected by mean of a rod with wires from an electric pile. A graduated arc marks the deviations of the instrument.

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226. Stanley, W. F. Jan. 26.

FIG.1.

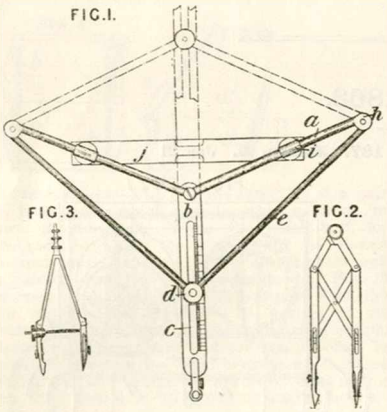

FIG.3.

FIG.2.

Arc-describing instruments.—Rods *a*, *e* are jointed together at *h* and pivoted at *b* and *d* to a bar *c*. The rods *a* pass through swivelling sockets *i* on a bar *j*. By adjusting the pivot *d* along the bar *c*, the angle between the rods *a* is adjusted, with the result that as they rock about the points *i* the pencil describes arcs of different radii.

Compasses, drawing; dividers.—Compass legs may be connected by cross-bars as shown by Fig. 2, or by "lazy-tongs" mechanism. Parallel motion in spring bows may be secured by a screw, Fig. 3. Needle points may be secured by passing them through a hole in the end of a screw which can be tightened up. They may also be pushed back against a spring in a sheath.

243. Barlow, H. B., [*Marechal, E.*]. Jan. 28. *Drawings to Specification.*

Current meters.—Rotary fans connected with visible wheels or indices are used for indicating the direction and velocity of flow of fluids in the pipes of an apparatus for preserving wood.

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263. Weston, T. A. Jan. 29. *Drawings to Specification.*

Compasses, drawing.—The pin on which the arms of the compass are pivoted has a series of friction discs fixed to it, which alternate with similar discs loose upon the pin, so that the tightening of the joint is effected by the increased friction between the discs when the joint screw is tightened.

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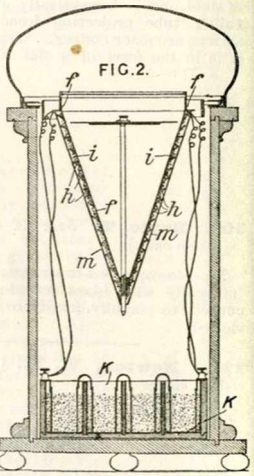
401. Gisborne, J. S., and **Simpson, W.** Feb. 14.

FIG.2.



Compasses, magnetic.—To neutralize local influence on mariner's and other compasses, electricity is applied. Fig. 2 shows a ship's binnacle and compass in section. A conical or hemispheroidal casing *f* is arranged below the compass, either suspended from the gimbal compass frame or not. Around this casing insulated wires *i* are coiled, enclosed in an outer casing *m* of gutta-percha and separated from each other by projections *h* soldered on the frame *f*. The ends of the wires are joined to the poles of a battery K.

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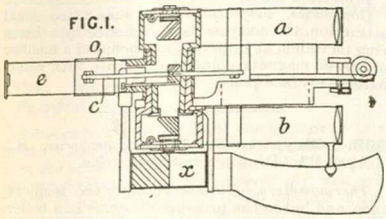
484. Wiard, N. Feb. 21. [*Provisional protection refused.*]

Thermometers.—A heat indicator for determining the temperature of ordnance during discharge, consists of a number of metallic rods inserted in longitudinal holes of varying depth in the metal of the gun. The rear ends of the rods are fixed by screwed thimbles, and the front ends are finished flush with the muzzle. Impressions of the muzzle are taken after discharge, and the elongation of the rods thus recorded.

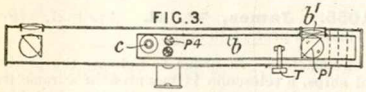
608. Adie, P. March 4.

FIG.1.



Angle-measuring instruments.—Relates to improvements on the invention described in Specification No. 357, A.D. 1860. The two telescopes *a*, *b*, one above the other, swivel about a common vertical axis and are fitted with a common eyepiece *e*. The upper telescope is connected by an arm c to a collar *o*, adapted to slide on the eyepiece. The telescope *b* is similarly connected to the same

FIG.3.



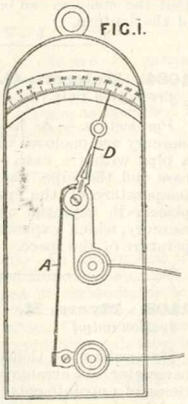
telescope. When one telecope is turned through an angle to one side, it results that the second one is turned through an equal angle in the opposite direction. A lower arm carries a half-silvered mirror *x*.

Telemeters.—An inner tube *b* pivoted at *c* carries the inner prism P^4 and the object glass b^1 and outer prism P^1. Adjustment is effected by the screw T.

670. Werge, J., [*Ross, A.*]. March 11.

Thermometers. — Relates to apparatus, in connection with an alarm, for indicating any regulated or given maximum and minimum degree of temperature. A compound strip of metal A, preferably of steel and brass, is in contact at one end, which is fixed, with one pole of a battery, while the other end is allowed to move freely under the action of heat. The other pole of the battery is in contact with a pointer arm D, which may be turned so that the pointer moves along a scale graduated so that the temperature which the pointer indicates is that at which the expanding metal strip A comes in contact with the pointer D and so completes the circuit. The alarm may be given by a bell, or a light, or an electric shock to the attendant, or otherwise. By placing the strip A on the other side of the pointer the apparatus may be used as a low-temperature alarm; by using two pointers it may be used as a high and low temperature alarm. The apparatus may be used as a fire-alarm, or it may indicate the temperature of hay, coals, or other spontaneously combustible substances, or it may be used in greenhouses, ovens, drying-rooms, furnaces, boilers, stills, &c.

FIG.1.



695. Alexander, R. March 14.

FIG.1.

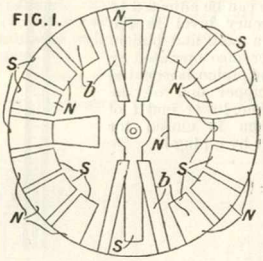


FIG.2.

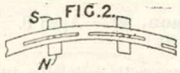
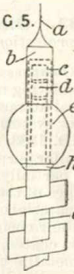


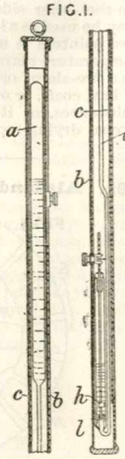
FIG.5.



Compasses, magnetic.—Relates to arrangements of the kind described in Specification No. 2611, A.D. 1862, for adjusting mariners' compasses, and to the materials used for constructing the various parts. Compensating-magnets *b* may be placed on the compass card, as shown in Fig. 1, or above, or under, or both above and under the card; or they may be attached to a slotted metallic rim Fig. 2, surrounding the compass card, or on the face, or around the rim of a cylinder of wood, metal, or ebonite. In every case the adjoining ends of the magnet are of like polarity. The compass cards, and the parts in connection therewith, are of aluminium or ebonite, and the rims, bowls, hoods, boxes, binnacles, gimbals, and other parts of the apparatus are made of ebonite or of a composition of india-rubber and steel filings. The steel point *a*, Fig. 5, for carrying the compass card, has a spring support consisting of the metallic tube *b* placed over the tube *c*, which, together with an india-rubber ball *e*, rests on the shoulder *h* of the vertical magnet *d*. One or more magnetic needle cards, fixed to the same or to distinct pivots, may be used, and electricity may be applied in conjunction with a part or the whole of the appliances. The whole of the apparatus may be enclosed in an iron globe, constructed of two hollow hemispheres secured together by spring fastenings, lined if necessary with wood, felt, or india-rubber, and provided with apertures to give light to the interior.

813. Symons, W. March 28.

FIG. 1.



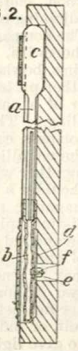
Barometers.—The siphon tube *a* is enclosed in a casing *b* within which a tube c carrying the scale is mounted. The lower end of this tube can be adjusted to the mercury level in the well by a rack and pinion. A vernier, also operated by a rack and pinion, is mounted at the upper end of the scale. The lower end *l* of the siphon is closed for transport by a plug *h*.

883. Simpson, W. April 8. [*Provisional protection only.*]

Compasses, magnetic.—Relates to means for insulating magnetized needles from the effects of local attraction, and is employed preferably with the system described in Specification No. 401, A.D. 1863, in which electricity is applied for a similar purpose. The needles are enclosed wholly or partially, but preferably with the ends and the edges of the centre pieces open, in an "insulating "material of gutta-percha, india-rubber, or any of "their compounds" and the "magnetized needles, "so coated, are enclosed in a soft iron or other "metallic box of the same form as the coated or "insulated surface of the needles."

889. Mitchel, W. H. April 8.

FIG. 2.



Barometers.—The pressure is indicated by the height of alcohol or other liquid in a glass tube *a* connecting an air or like closed chamber c and a slightly flexible chamber *b*, preferably a flat glass or metal box with one or more corrugated sides. The instrument is adjusted by a nut *f*, screw *e*, and flat spring *d*, or by a bent spring one end of which carries a screw bearing against one side of the chamber *b*. In a modification, the flexible chamber is arranged behind and connected by an elbow-joint to the tube *a*.

955. McLay, J. L. April 16. [*Provisional protection only.*]

Compasses, magnetic. — To neutralize local attraction, the compass is surrounded by a brass ring on which, at intervals, are mounted a number of curved magnets, pointing outwards, with alternately reversed poles.

998. Bryant, F. E., [*Ambrouseus, H.*] April 22. *Drawings to Specification.*

Thermometers.—For ascertaining the temperature, and hence the pressure of steam in a boiler, the bulb of a thermometer is placed inside the boiler, and may be protected by a pipe. The lower part of the stem, immediately above the bulb, passes through a casing screwed into the boiler plate, and the upper part is protected by a frame which partly encloses the scale-plate. In a modification, the stem is disposed horizontally.

1055. James, W. H. April 27. [*Provisional protection only.*]

Telemeters.—In order to indicate the position of ships, a telescope is mounted in a frame free to move horizontally and vertically, which frame is connected by rods with a tracer, moving over a map of the district and indicating on the map the direction in which the telescope is pointing.

1065. Fuller, G. W. April 28. *Drawings to Specification.*

Compasses, magnetic.—A small mariners' compass is so arranged between the flame and the glazed door of a submarine lamp or lantern that the compass can be read from the exterior of the lantern.

1084. Holcroft, G. April 29. [*Provisional protection only.*]

Pyrometers. — A bulb and stem containing mercury are enclosed within a tube connected to a pipe within a case. Air passes between the case and the pipe, and becoming heated to the temperature of the space in which the case is placed, it impinges upon the bulb containing mercury, which expands and indicates the temperature of the space.

1108. Myers, H. May 2. [*Provisional protection only.*]

Barometers. — Consists in combining with a barometer an arrangement for indicating the times of appointments. A dial or rectangular skeleton case, is marked with twelve divisions representing hours and one blank, and with corresponding spaces in which the engagements may be written. Attention is drawn to them by

indicating-hands mounted on a central pivot, or by buttons placed in holes in the case. The blank space is for receiving the hands when there are no appointments.

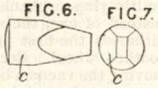
1174. Burrell, J. May 9. *Drawings to Specification.*

Salinometers.—To estimate the amount of salt in the water in ships' boilers, two pipes are led from the water in the body of the boiler and from the steam space at the top, respectively, and are joined at their other ends to a vertical glass tube; cocks are provided on these pipes. The steam in the upper pipe condenses and, by means of the cocks, a given volume of condensed water may be allowed to enter the glass tube. This water may be allowed to rest on the salt water entering from the boiler; its level will thus be higher than the boiler water level as indicated by a gauge placed next the tube, and by calculation, or reference to a table, the boiler water density may be found from the difference in level.

1200. Wilde, H. May 13.

Lenses.—A lens for use with the step-by-step telegraph instrument, described in Specification No. 858, A.D. 1861, [*Abridgment Class* Electric telegraphs &c.], is formed of a cylindrical piece of glass c, with one end made convex and the other end tapered off so as to reduce the field of view.

FIG. 6. FIG. 7.



1204. Cassaignes, V. J. May 13.

Stereoscopes.—Tinting is effected by coating the flat side of plano-convex viewing lenses and prisms with transparent colours, and protecting them by cemented cover glasses, as described in Specification No. 2618, A.D. 1863.

1337. Boutet, C. T. May 28. [*Provisional protection only.*]

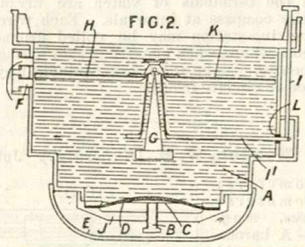
Telemeters; theodolites.—An instrument for measuring distances and altitudes is described, in which a telescope is fixed at right-angles to a double rule consisting of two rules fastened together so as to form a slide. On a sliding piece is mounted a horizontal graduated circle carrying a double alidade to measure horizontal angles. A second telescope, fixed on the alidade and movable in a vertical plane above the first, enables vertical angles to be measured by means of a graduated circle attached to one of its mountings.

1392. Maurice, J. June 3. [*Provisional protection only.*]

Rulers.—Parallel lines are ruled by the aid of a cylinder or roller mounted, by means of reduced ends or an axial rod or pin, in a sheath or hollow case, or in a frame, rail, or ruling-bar. One or both edges of the sheath form a fence, bar, or face for grinding the pencil, pen, or ruling-instrument. A graduated pin, or a pin on which slides a graduated tube or ferrule, for gauging the distance apart of the rulings, is received in a hole at one or either end of the sheath or fence rail; if the sheath or fence rail be of wood, a ferrule is preferably inserted. The sheath or equivalent may be engraved or otherwise provided with scales of length, tables of weights and measures, and other information.

1409. Hollingsworth, A. J. June 8.

FIG. 2.

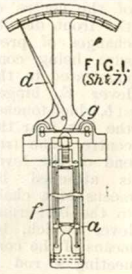


Compasses, magnetic.—In liquid compasses, the bowl A is closed at the bottom by an elastic diaphragm D, which is secured in place and covered by caps J, E and is acted on to adjust the hydraulic pressure by a plate C and a screw B. The compass card K, which carries a needle H made in two pieces, can be raised off the bearing-pin G by projections on a lever I^1 operated by a rod I and passing through an aperture L fitted with an india-rubber or like disc. Filling-apertures are provided, closed by screws F covered by a small plate. The compass is secured to the card at the centre by steady pins passing through flaps on a brass tube.

1449. Clark, W., [*Merlanchon, A.*]. June 11.

Pyrometers.—The relative movement of a metal tube *a* and a glass or like rod *f* is communicated through the spring diaphragm *g* to the lever *d*, which may work over a dial or be connected to an index at a distance.

FIG. 1. (Sh. 7)



1512. Brooman, R. A., [*Anthoine, J. J., and Brossette, F. E. H.*]. June 16. *Drawings to Specification.*

Reflectors. — The silvering is protected by applying successive coatings of a solution of gutta-percha or caoutchouc and colophony in turpentine, glue containing whiting, and varnish. The gutta-percha may be replaced by white wax dissolved in turpentine. The silvering may also be coated with a varnish composed of gum lac and resin dissolved in amyl or ordinary alcohol.

1553. Jenkin, F. June 20. [*Provisional protection only.*]

Compasses, magnetic. — To transmit compass readings to a distance, the magnetic needle carries an electric contact which completes a circuit through one of a number of parallel circuits the terminals of which are arranged round the compass at intervals. Each wire at the receiving-station may be coiled around a radial core which, when energized, sets a magnet at the centre. Make-and-break contacts may be employed to obviate friction.

1715. Newton, W. E., [*Richard, F.*]. July 9.

Barometers; thermometers; compasses, magnetic. — A barometer of the aneroid class, capable of acting as a thermometer by filling the corrugated box with alcohol or the like, may be combined with a magnetic compass. Figs. 11 and 13 show one arrangement of the barometer. A is the corrugated box, the middle of the back being in contact with the frame; the motion of the centre of the front due to changes of pressure being communicated to the lever E, hinged at *b*, which touches the box near the centre. The free end of the lever is attached by means of a chain to the bell-crank lever which, by means of the connecting-rod *e* moves the toothed sector H, having its fulcrum at *f*; the sector then moves the pinion I and with it the hand *a*, the shaft being provided with a spiral spring *h* to steady the mechanism. The flexions of both sides of the box are transmitted to the hand, as the back of the box is in contact with the frame. In another form there is a separate lever for each side, the end of each acting upon a double bell-crank lever and actuating the hand as above. In another arrangement the chamber is lentil-shaped, and the spiral spring is placed on a lateral axle, having a large toothed wheel gearing with the pinion of the index. To reduce the dimensions of the instrument, in another arrangement the stud in contact with the diaphragm is fixed to a small elbow lever, the other end of which moves a toothed sector gearing with a pinion fixed to the toothed sector which moves the index hand. The elbow lever is pivoted on the free end of a long lever, which can be raised or lowered by means of a screw for the purpose of regulating. In another arrangement, Fig. 22, the contact point is part of the lever arm c mounted on the shaft E, which also carries a second arm *b* perpendicular to the first, and connected by a small rod *e* with the toothed sector H, and takes into the pinion I mounted on the shaft of the pointer *d*. The point is pressed against the diaphragm by the spiral spring *h* and also directly by the spring *d* bearing upwards upon free end of lever *c*. The spring *h* may be mounted on a supplementary wheel. The multiplying-mechanism may comprise two pinions instead of one, the spiral spring being mounted either on the first pinion or on a supplementary toothed wheel. Regulation may be effected by moving the vacuum box relative to the mechanism, by means of a nut bearing on the outside of the frame and gearing with a male screw fixed to the diaphragm. To maintain contact with the mechanism, three springs are fixed to the frame and bear by means of a washer on the vacuum box on the same side as the nut; a single spring with three arms may be substituted for the three. The spring or springs may act upon the opposite face of the vacuum box, the nut then bearing on the inside of the frame, and a single U-spring may then be used. The screw may be screwed direct into the frame and a bow spring, bearing upon the frame, fixed to it on the outside. Various forms and arrangements of springs are described for strengthening or stiffening the corrugated box.

FIG. 13.

FIG. 11.

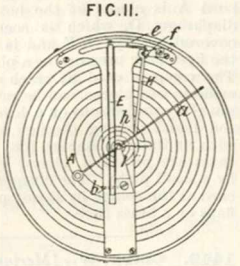
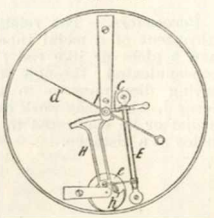


FIG. 22.



1717. Gowland, G. July 9. [*Provisional protection only.*]

Sextants, quadrants, and the like.—Two horizon glasses are employed, one, which is wholly silvered, being placed behind the ordinary horizon reflector at an angle of 15°. By means of an additional reflector and index glass the object is reflected on to the additional horizon reflector, and thence through the unsilvered half of the ordinary horizon reflector. Both of the index glasses are arranged to move together. In an arrangement for measuring altitudes, an additional glass is fixed at each side of the index glass, both moving together. The images are reflected on to the horizon reflector across which are two lines to enable the instrument to be held upright. The

apparatus is adjusted to bring the object down to a mark in the centre of the horizon glass.

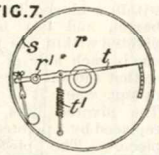
1817. Lyman, J. July 20. [*Provisional protection only.*]

Scales.—A number of scales are drawn upon the faces of an instrument of triangular or quadrangular form. A micrometer head is fitted to read the subdivision of any particular scale. The scale may be temporarily attached to a T-square for use.

1832. Jackson, P. R. July 22.

Pyrometers.—For taking the temperature of wheel tyres, whilst in the rolling-mill, a pyrometer is employed having a rotary portion adapted to be pressed against the tyre. An index *t*, Fig. 7, is pivoted at r^1, and connected to a steel or like band *s*, attached at one end to, and wound round, a fireclay disc *r*, mounted on a bush revolving on a stud fixed in a handle or lever. The band is kept taut by a spring t^1. The edge of the disc is pressed against the revolving tyre, and the increase of length of the band is indicated on a scale. In another form of wheel thermometer, a hollow rim containing mercury communicates with an axial graduated glass tube.

FIG.7.



1935. Gowland, G. Aug. 6. [*Provisional protection only.*]

Compasses, magnetic.—The errors in mariners' and other compasses due to local attraction are compensated by movable magnets, preferably of circular form and arranged in line with the keels of the vessels and at the level of the compasses. Each magnet may be mounted on a pivot or floated in a liquid.

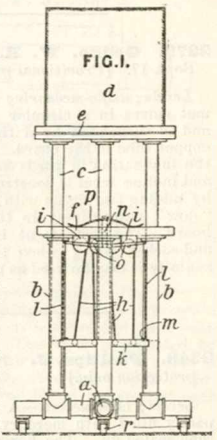
2107. Fattorini, S. Aug. 26. [*Provisional protection only.*]

Compasses, magnetic; protractors; scales; sextants, quadrants, and the like; barometers; thermometers; surveying-instruments. — Relates to "a new division of time and the application "thereof to mathematical and other instruments." The division of the scales are stated to be "in "conformity with the formula which determines "the proportion that as four is to six so eight is "to twelve, and so on with regard to the numbers "of the squares to infinity," the desired result being attained by describing a circle around a square and then a square about the circle, and so on. The division of numbers or scale is stated to be applicable to the following instruments, namely, the universal meridian, the sea and geometrical compass, the celestial and terrestrial globes, the protractor, the sextant, octant, and quadrant, the graphometer, the barometer, the thermometer, and "the meter weights and measures."

2252. Whipple, J. A. Sept. 12.

Tripod and like stands. — A table *e* for a camera *d* is carried by one, two, or three telescopic pillars *c*, the lower parts *b* of which are mounted on a T-shaped frame *a*. The lower or fixed tubes *b* are slotted at *l* to allow the pins *m* on the tubes *c* to project so as to bear on the frame *k*. One or more cords *h*, attached to spring fusees *i*, are connected to the frame *k* and are arranged to balance or just raise the camera. The lower tubes *b* are provided with a table *f* in which a pin *n* works and is held supported by a spring *p*. The lower end of the pin *n* is connected to pivoted levers *o*, the outer ends of which are forced into contact with the tubes *c*, through slots in the tubes *b*, so as to act as detents. The stand is shown mounted on castors or rollers covered with india-rubber or other elastic material.

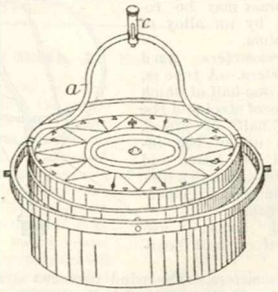
FIG.1.



2253. Riviere, H. Sept. 14. *Drawings to Specification.*

Anemometers. — The volume of air passing through a ventilating-stove is indicated by a pointer operated by a pivoted or other disc exposed to the current of air.

2268. Rahill, J. Sept. 16.



Compasses, magnetic.—To facilitate filling &c., liquid compass bowls are fitted with tubes *a* terminating in a head *c* with a screw stopper. The tubes may not be united. In overhead compasses a central tube may be employed.

2279. Gedge, W. E., [*Chairgrasse, J. B.*]. Sept. 17. [*Provisional protection only.*]

Levels; angle-measuring instruments.—A plummet moves in a circular groove cut in a board, and is suspended by a thread passed through a copper tube in the board. The graduations show the inclination in yards &c. A combined simple and incline level is constructed in the same way, by adding two sights with a "hole" and a "window" respectively in the upper part of the board. The instrument is supported by a ball-and-socket joint; when the board is set horizontally it may be used as a graphometer.

2348. Phillips, J. Sept. 23. [*Provisional protection only.*]

Levels; clinometers.—A U-shaped channel is partly filled with mercury, exhausted of air and then sealed up. The horizontal section may be formed in a sheet of plate glass. Levels are taken by sighting over the tops of the mercury columns.

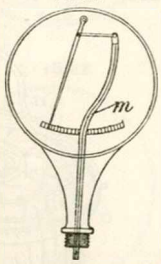
2383. Bailey, J., Blake, G. W., and **Bailey, W. H.** Sept. 28.

Barometers, aneroid. In instruments of the Bourdon-gauge types, the tube is made up as shown in cross-section by Fig. 5, of halves of steel and brass or, as shown by Fig. 6, a plate of steel may be fixed on to one side of a tube of brass. The brass may be replaced by an alloy of aluminium.

FIG. 5.

FIG. 6.

FIG. 7.



Thermometers and pyrometers.—A tube *m*, Fig. 7, one half of which is made of steel and the other half of brass, curves under the influence of heat and indicates through a link and pointer on a temperature scale.

Wind vanes are mounted on ball bearings.

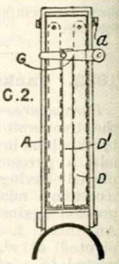
Anemometers.—The wind pressure acts upon the underside of a trapped bell, the rise and fall of which is indicated by rack-and-pinion gearing.

Sounding-apparatus.—The pressure, which depends upon the depth, is indicated by the straightening of a hollow curved tube which the water is free to enter.

2399. Browne, B., [*Brighton, W.*]. Sept. 30.

Plumbing-instruments.—In order to enable a gun to be held in the correct position for sighting, a hollow metal piece D having a long slit D^1 is pivoted by screws *a* within a hinged leaf on the barrel, and two bars are pivoted within the piece D, one in each side of the slit, so that the slit is obstructed, except when it is vertical. The pivoted bars may be replaced by a pivoted slotted piece. The piece D is retained with the leaf A by a hinged forked piece G.

FIG. 2.



2521. Sonnenstein, O. E., [*Soderberg, O. J.*]. Oct. 14. [*Provisional protection only.*]

Reflectors.—In order to enable anyone, without appearing at a window, to view outside objects, pairs of mirrors are arranged, touching along contiguous edges and making any convenient angle with each other. When four mirrors are used together, they may be arranged as sides of a pyramid.

2599. Bullock, F. Oct. 22. *Drawings to Specification.*

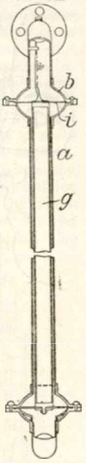
Logs.—The resistance offered by a metal cylinder to being towed is indicated by a spring balance, which is graduated to show the corresponding speed.

2618. Cassaignes, V. J. Oct. 23. [*Provisional protection only.*]

Stereoscopes.—The lenses, prisms, or glasses of stereoscopes of the kind described in Specification No. 1204, A.D. 1863, are coloured by forming them in two parts, one of which may be merely a thin cover-glass, joined by coloured cements. The depth of colour may be varied by altering the thickness of cement.

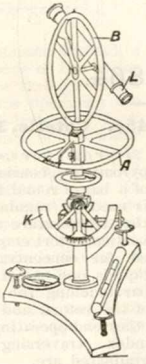
2655. O'Neill, P. B. Oct. 27.

FIG.2.



Salinometers.—Fig. 2 shows a section of a salinometer for a steam generator. Within chambers *b* in a hole *a* are mounted two elastic diaphragms *i*, connected by an inner tube *g*, which is weighted at its lower end and is immersed in water. The upper end of the tube *a* communicates with the steam space, and the lower end with the water space, at a certain distance below the watel level. The upper disc, the level of which depends upon the density of the water in the boiler, is fitted with an arm which operates an indicator. The tube *g* may be graduated for this purpose and read through a frame fitted in the outer tube *a*. A water-level indicator may be added, in which to correct the readings of the salinometer for variations of the level of the water in the boiler.

2674. Brooman, R. A., [*Emmanuel, C.*]. Oct. 28.

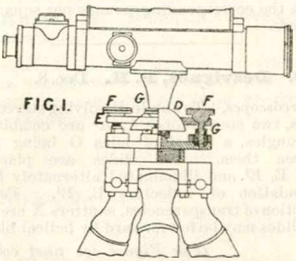


Theodolites; latitude instruments; angle-measuring instruments. — The Figure shows an instrument for determining the positions of the heavenly bodies, with respect to the horizon, the equator, or the ecliptic. A telescope L is fitter to rotate about the axis of a graduated circle B set at right-angles to a second graduated circle A. The spindle supporting these two circles may be tilted from the vertical by worm-and-rack gearing, the angle of tilt being indicated on a graduated semicircle K.

2699. Parkes, S. H. Oct. 31.

Optical instruments. — To prevent heat and irritation in the eyes, the eyepieces of telescopes and opera glasses, microscopes, and other optical instruments are made of pebble or rock-crystal or other material, having a greater specific conductivity than glass, and a plate of tinted glass, which intercepts yellow rays, is inserted between the lenses of the eyepiece. In spectacles and single-lens instruments, a pebble or rock-crystal lens and a tinted lens are combined, preferably by being cemented together with Canada balsam. The tinted glass, which may be combined with an eyepiece lens and may serve to correct spherical aberration, is of a grey or bluish neutral tint.

2714. Pastorelli, F. J. Nov. 3.



Levels; surveying instruments. — The stem of the level is fitted at the lower end with an inverted cup D, which forms a ball-and-socket joint with the top of the tripod. The level is adjusted by swivelling screws G which bear upon a plate E fitting over the cup D. A spring may be interposed between the head F and the stem of each screw.

2771. Braham, L. Nov. 7.

FIG.1.

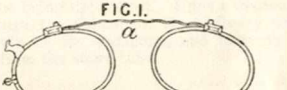
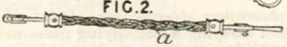


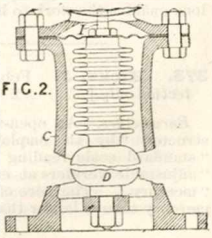
FIG.2.



Spectacles and eyeglasses.—The spring *a* or the frame of a pair of eyeglasses, the frame of an eyeglass or pair of spectacles, or a hand frame is composed of a number of parallel, interwoven, plaited, or braided wires preferably arranged as flat as possible.

2794. Mash, J. Nov. 10.

FIG.2.



Thermometers for indicating the temperature of steam by means of the expansion of a vessel containing mercury. The interior of the pillar C is open to the steam, and contains a metal vessel D partly corrugated as shown, and filled with mercury, and fixed at the bot-

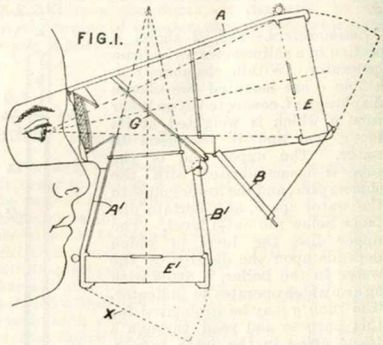
tom to the pillar. The motion of the top of the vessel, due to expansion or contraction of the mercury, is transmitted by the rod I, having at its upper end a toothed rack, to a pinion fixed to a toothed sector which moves the pinion on the shaft carrying the index travelling round the dial. The latter may be graduated in degrees and in the corresponding pounds per square inch pressure.

3089. Desvignes, P. H. Dec. 8.

Stereoscopes.—To obtain dissolving stereoscopic effects, two stereoscopes A, A^1 are combined at right-angles, a sheet of mica G being placed between them. The slides are placed in boxes E, E^1 and illuminated alternately by the manipulation of reflectors B, B^1. For the inspection of transparencies, shutters X are fitted. The slides may be fed forward by helical blades.

(*For Figure see next column.*)

3089.



A.D. 1864.

270. Rowsell, C. J. Feb. 1. [*Provisional protection only.*]

Graphoscopes; stereoscopes.—Relates to a folding easel carrying a magnifying glass or glasses, applicable for viewing photographic and other pictures, coins, and medals. The apparatus, which stands on a table or other support, consists of two parts hinged together, one part serving as a base while the other, which is held by a hinged strut, is provided with a sliding rest and either one large lens for viewing ordinary pictures or two lenses for viewing stereoscopic pictures. In the latter case, a hinged portion extends at right-angles to the easel between the lenses. When used in the drawing or painting of pictures, the lens enables the work to be viewed.

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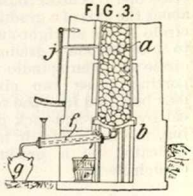
373. Hicks, J. Feb. 12. [*Provisional protection only.*]

Barometers.—An open-scale barometer is constructed "by the employment of an absolute "standard scale reading from the centre, with "adjustable verniers at each end of a column of "mercury." The bore of the bottom half of the mercury tube is larger than that of the top.

454. Cotelle, E. A. Feb. 23.

Pyrometers.—A pyrometer *j*, consisting of a bar of round iron, is used for regulating the temperature of a vertical retort employed for concentrating liquids, one end of the bar touching the wall of the retort, and the other end operating an index traversing a graduated arc.

FIG.3.



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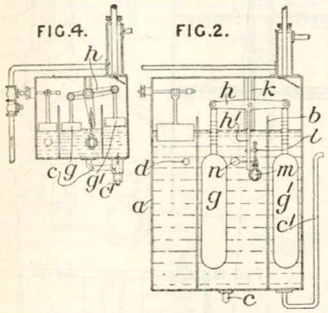
696. Burrell, J. March 18.

Salinometers.—Relates to apparatus for operating automatically the scum or brine and feed cocks of marine boilers, stated to be applicable also as a salinometer and water gauge. It consists of a closed tank *a*, Fig. 2, divided by a vertical partition *b* into large and small compartments containing brine and distilled water respectively. Hollow vessels *g*, g^1 float submerged in these compartments, and are connected with the opposite ends of a lever *h* pivoted at the centre. This

lever is capable of sliding vertically in the guide k, and is formed with a depending arm h^1 bearing against the arm l of the brine cock m. Pipes c, c^1 connect the compartments with the water space of the boiler, the pipe c^1 being considerably bent to prevent mingling of the boiler water and distilled water. Another pipe d ensures a constant circulation from the boiler to the brine compartment. Normally, the lever h is horizontal with the cock m in the closed position. As the density in the boiler increases, the float g rises and operates the lever so as to open the cock m. A weighted lever n closes the cock when the float g assumes its normal position. The densities in the two compartments are indicated by rings or the like placed on the float stems and viewed through glass panels in the side of the tank. The

FIG.4. FIG.2.



supply of distilled water is maintained through a pipe leading from the steam space of the boiler and surrounded by a chamber through which the feed is passed. A float for operating the feed-cock is used. In a modification, Fig. 4, the floats g, g^1 rest on the surface of the water in the two compartments, the lever h being operated by the rising of the level of the distilled water as the density of the brine increases. In order to keep the distilled water at the same temperature as the brine, the pipe c is made large in diameter and the pipe c^1 passed through it. With this arrangement, the bends in the pipe c^1 are replaced by a box containing baffles. The movements of the lever h are transmitted to a pointer which indicates on a dial the variations in the water levels and consequently the density of the boiler water.

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781. Arthur, W. March 29. *Drawings to Specification.* [*Provisional protection only.*]

Compasses, magnetic.—A number of magnets are fastened on a vertical shaft turning freely, and the whole is enclosed in a paper-covered cylinder ruled horizontally. A pencil is held in a frame which is made to move vertically downwards either by the rotation, by means of clockwork, of a threaded rod passing through it, or by using a band passing over rollers, one of which is rotated in the same way. A ribbed roller, also revolved by the clockwork, comes at intervals against a projection on an arm on the pencil frame, and the pencil which is normally held back by a spring, marks the paper, thus indicating the course.

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799. Kurts, M. March 31. [*Provisional protection only.*]

Thermometers. — The handles or sticks of umbrellas, sunshades, walking-sticks, and other similar articles, are provided with grooves in which thermometers are fixed.

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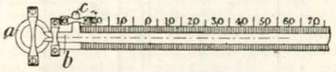
809. Hicks, J. April 1.

FIG.1.



Thermometers.—Maximum mercurial thermometers are constructed with a short tube or mercurial chamber projecting preferably at right-angles from the side of the ordinary column tube near the bulb, and having a bore larger than that of the column tube. The thermometer is set by holding the bulb a downwards so as to fill the short tube c, and is then placed horizontally, the short tube being uppermost. Upon a decrease of temperature, the column in the ordinary tube b will remain at its maximum, and mercury will descend from the short tube.

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829. Potts, F., and **Green, A. H.** April 2. [*Provisional protection only.*]

Tripod and like stands.—Relates to a portable stand forming an outdoor sketching or other easel, music rest, target support, or the like, and collapsable into the form of a walking or climbing staff. Three or more standards of segmental tubing fold together into a form of circular or other cross-section, and are united at one end by a joint or cap, and at the other end by solid or other shanks. The rest for the canvas stretcher or board is provided with adjustable attachments. The parts when collapsed are enclosed in a tubular case, the shanks projecting as a spear. The case serves as a mahl or rest stick.

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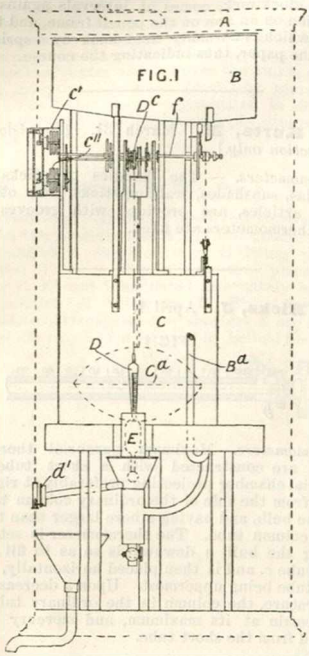
856. Hughes, E. T., [*Glaeser, T.,* and *Hofman, E.*]. April 6.

Specific-gravity estimating-apparatus. — To measure the "quality" of alcohol obtained in distilleries, an "alcoholometer" D is suspended in a vessel E, into which the discharge pipe from a measuring-vessel C empties itself, by means of a

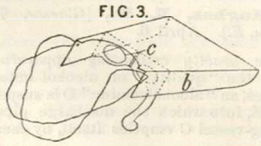


cord passing over a pulley D c, which is mounted upon a shaft in connection by means of a train of wheels with indicating-apparatus c^{11}.

1072. Ghislin, T. G. April 28.

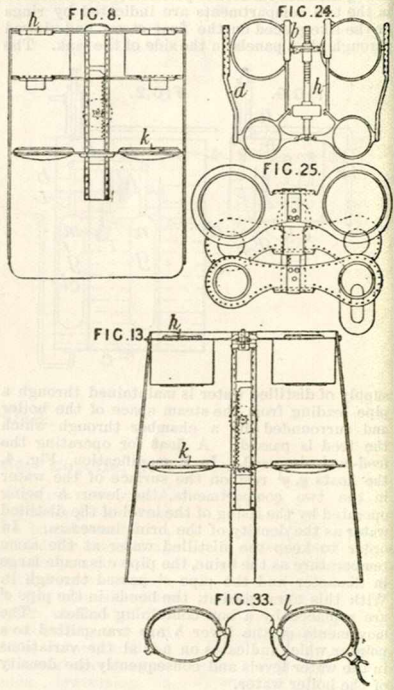
Compasses, magnetic.—Compositions containing seaweed, treated as described in Specification No. 2035, A.D. 1862, [*Abridgment Class* India-rubber &c.], gums, india-rubber, gutta-percha, resins, bituminous substances, paraffin, and oily or fatty substances, together with fibrous materials, potassium or sodium silicates, powdered chalk, talc, metallic oxides, gelatine, farina, alum, tungstic acid, powdered charcoal, and similar substances, are used for boxes for compasses.

1149. Rieder, A. May 6.



Eye-shades.—Fig. 3 shows a shade, in which the sides *b* and lens frame *c* are adapted to fold. In a modification, the frame *c* is adapted to slide in guides and be balanced by a spring.

Opera-glasses, folding. The eye-lenses *h* and the objectives *k*, Fig. 8, are mounted in pivoted frames which can be folded down flat. The focussing is effected by rack-and-pinion gear. The lens frames may each be pivoted separately about an axis carried by the central bar and normal to the plane of the paper, as shown in Fig. 13. Fig. 24 shows a form in the folded position. Each lens is mounted in a frame free to



turn about an axis *b* across the focussing-screw. The eye-lens frames and the objective frames are connected by links *d*, *h*. Fig. 25 shows a modification of the arrangement shown by Fig. 24. In a further modification, the folding-down of the lens frames simultaneously through a pin-and-slot movement causes the members of each pair of lenses to slide nearer together.

Eyeglasses.—Fig. 33 shows an eyeglass in which a slit *l* is formed above each eye-lens for the reception of a flexible shade.

Stereoscopes.—The improvements in shades may be applied to stereoscopes, by the addition of folding bottom and back pieces.

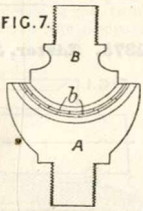
1454. St. Martin, H. R. de. June 13. [*Provisional protection only.*]

Ellipsographs.—Two compass legs are connected to a third leg by means of a ring or collar so that they may revolve round it. The third leg, which is always kept perpendicular and stationary, carries a semicircular plate which may be adjusted to any height and at any angle to the horizon. If one leg carrying the pen or pencil be made to pass round the plate in contact therewith a semi-ellipse or semicircle, according as the plate is inclined or horizontal, will be described. The ellipse is completed by making the other leg, to which the leg carrying the pen or pencil is rigidly, but adjustably, connected, pass round the plate in contact therewith. To alter the size of the ellipse without moving the plate a second pencil is mounted in a bar fixed horizontally to the leg carrying the ordinary pen or pencil.

1519. Johnson, J. H., [*Derogy, E. E. N.*]. June 18.

Lenses, grinding and polishing. Concave and convex "glasses" are simultaneously ground by the mutual attrition, with emery or other abrasive, of glass on glass, the rough pieces *b* being cemented on both holders A, B, in place of the method in which one holder only is used in conjunction with a metal polisher.

FIG. 7.



1520. Johnson, J. H., [*Dodé, E.*]. June 18.

Reflectors.—Mirrors and other reflecting-surfaces are made by coating glass with platinum, as follows:—Platinum is dissolved in aqua regia, and to the product, evaporated to dryness, is added essence of lavender or other suitable oil. The whole is then mixed with litharge, or other compound of lead, ground with essence of lavender, or other suitable material. The preparation is then diluted with essence of lavender and applied, with a brush or otherwise, to the glass, which is then subjected to an elevated temperature.

1601. Berthon, E. L. June 25. [*Provisional protection only.*]

Tripod and like stands.—The feet of a tripod stand for telescopes and like instruments are made separately, the outer ends being provided with castors, balls, or rollers, and the inner ends consisting of rings which receive the pivot of the pillar and stand, and are retained thereon by a thumb-screw. The telescope &c. is supported on a semicircular or grooved plate, and at its eyepiece end is provided with a projection connected to the upper end of the elevating-screw, the lower end of which passes into a split screwed socket attached to the lower part of the pillar. The two halves of the socket are closed together to engage a thread on the elevating-screw by means of a siding ring, and the telescope is adjusted by turning the screw by means of a milled button. The lower end of the pillar is provided with a pivot which passes into a recess in a smooth slab of slate or other material.

1613. Newton, W. E., [*Chazelles, J. A. E.*]. June 27. [*Provisional protection only.*]

Bubbles, apparatus for blowing.—A toy apparatus, applicable also for perfuming the air in apartments, consists in a cylindrical tube, mounted on a reservoir, the bottom of which is closed by an elastic membrane. One end of this tube, a side branch of which is provided with a flexible tube, extends to near the bottom of the reservoir, while the other carries a cup. On pressing the elastic bottom of the reservoir a small portion of the soap or other solution, which may be scented, is forced into the cup. Air is then blown through the flexible tube. The apparatus may be made of metal, india-rubber, gutta-percha, horn, porcelain, crystal, or plain or coloured glass.

1647. McCallum, D. July 1. [*Provisional protection only.*]

Range-finders.—The distance of a man or other object of known size is ascertained by a strip inserted in the barrel of a gun and having rectangular openings at the top and bottom. The strip is positioned in the gun by lugs. The gun is adjusted until the object viewed coincides in length with the aperture, and the distance is read from a tape extending from the apertured strip to the eye. When the distance exceeds a certain length, the apertured strip is supported by a long rod screwed to it.

1770. Saunders, J. July 15.

Specific-gravity estimating-apparatus.—In an apparatus for estimating the density of the water in a steam boiler, water from the boiler enters by the cock shown at the top of the apparatus in Fig. 2, and passes by a passage B into the main compartment C, in which a hydrometer and a thermometer are placed. The water passes away by the passage D. A frame containing glass, or other transparent material, is secured to an opening in the front of the apparatus, so

FIG. 4.

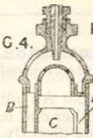


FIG. 2.

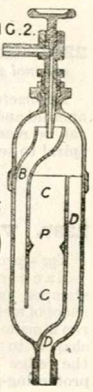


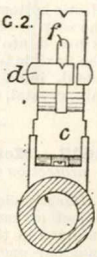
FIG. 10.

that the indications of the instruments may be read. The mouth of the outlet passage D may be half-way up the main compartment C, and then the hydrometer is read from the surface of the water. Otherwise the passage D runs to the top of the compartment C, and V-shaped pointers P are fitted to the sides of the compartment; the hydrometer is then read from these pointers. In a modification, Fig. 4, the passage B opens above into the space between the domed top of the casing and a perforated hemispherical cap, through which steam may escape to the eduction passage D. In another modification, Fig. 10, the parts B and C are arms of a U-tube, which is supported on gimbals in a vessel forming the overflow compartment.

1887. Cope, J. July 29.

Range-finders.—Relates to a combined range-finder and gun sight. The leaf *c* of the rear sight is graduated on one side with the usual range-scale and on the other with the range-finding scale. The observer places his eye a fixed distance from the sight, and the cross-bar *d* is adjusted until the object of known height fired at, appears between the lower edge of the cross-bar and the bottom of the slot *f*. The range is then read off, and the sight adjusted in the usual manner.

FIG.2.



2243. McLay, J. L., and **Thompson, W. H.** Sept. 14. [*Provisional protection only.*]

Sextants, quadrants, and the like.—Sextants, quadrants, octants, circles, and like instruments, used for taking observations at sea during the night, are fitted with binoculars.

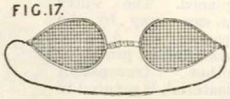
2267. Huntington, J. B. Sept. 16. [*Provisional protection only.*]

Barometers.— An altitude scale is fitted to aneroid and other dial barometers, so that heights can be read off directly. The scale may be on a spiral to secure equal divisions.

2337. Vale, H. Sept. 23.

Eye-protectors.—Each eye is stamped out of a sheet of metal. The rim is made trough-shaped to receive the edge of the protecting-gauze.

FIG.17.



2350. Arthur, W. Sept. 24. [*Provisional protection only.*]

Compasses, magnetic; courses, indicating.—Magnets are carried on the vertical shaft of a paper-covered cylinder, made to rotate regularly by means of clockwork. A pencil, held in a socket in a frame, is made to mark the paper at regular intervals by means of projections on a ribbed roller, which is made to revolve by clockwork, striking against a projection on the frame. The pencil frame is made to descend vertically by means of a threaded rod passing through it, or a band passing over rollers. An electrical marking-device may be used, in which a flange is moved up and down at intervals by clockwork, and in its downward movement strikes against a wire or rod, completing a circuit; an electromagnet in the circuit thereupon attracts its armature and, by means of a lever attached to this magnet, a pencil or point is made to mark the paper. Or photographic paper may be used, being marked by light admitted by an aperture.

2375. Lister, J. Sept. 28.

FIG.1.

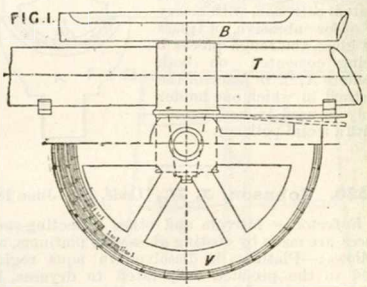
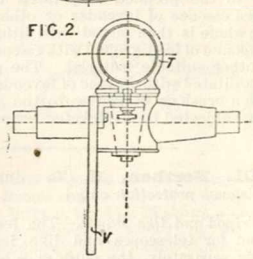


FIG.2.



Levels; theodolites; clinometers.—The sighting-telescope T is adapted to rotate about an axis at right-angles to the horizontal axis carrying the semicircle V, graduated to show inclinations. The telescope can thus be set to rotate in a plane making an angle with the plane of the horizon. A level B is fitted to the telescope.

2403. Hurry, H. C., and **Wilson, E.** Sept. 30. [*Provisional protection only.*]

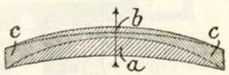
Range-finders.—The sliding cross-bar of the ordinary back-sight of a rifle is replaced by a central vertical wire, and the base of the knife-edge or bead of the fore-sight is widened, so that its width, as seen through the leaf of the back-sight, is that of the slot in the leaf. In sighting, the eye is placed at a fixed distance from the back-sight, and the distance between the top of the slot and the base of the fore-sight is adjusted until it is equal to the apparent height of a man fired at.

2459. Huntzinger, E. V. F. Oct. 6. [*Letters Patent void for want of Final Specification.*]

Compasses, magnetic.— To counteract the effects of iron situated in the neighbourhood of ships' and other compasses, the north pole of the magnet is replaced by a piece of lead or copper. Other means consist in fitting pieces of soft iron, or an iron ring without solder, in the compass basin.

2539. Dallmeyer, J. H. Oct. 14.

Lenses for photographic and other purposes. A negative flint-glass meniscus lens c is placed, it may be cemented, between positive crown-glass meniscus lenses *a*, *b*. The focal lengths of the crown-glass lenses *a*, *b* are in the ratio of 3 : 1 respectively. Specification No. 2574, A.D. 1857, [*Abridgment Class* Photography], is referred to.



2655. Fontaine-Moreau, P. A., Comte de, [*Bailly, F.*]. Oct. 26. *Drawings to Specification.*

Spectacles and eyeglasses.—The frames of spectacles are fashioned from a single blank by a succession of operations. The bridges of eyeglasses are made by stamping, without solder, the hinge being formed by folding the extremity.

2665. Brooman, R. A., [*Laurent, P. M. A.*]. Oct. 27. *Drawings to Specification.*

Sextants, quadrants, and the like.—To facilitate reading, the image of the object observed—a star, for instance—is drawn out into a line perpendicular to the plane of the instrument by the interposition of a cylindrical lens. The lenses are mounted in a similar way to the usual tinted glasses.

2885. Clark, W., [*Vandenbergh, H. A. J.*]. Nov. 18. *Drawings to Specification.*

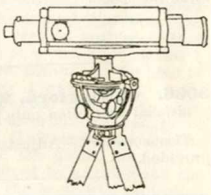
Rulers.—Consists in adapting rulers for use as graduated beams for weighing letters and other light articles.

2980. Dobbs, A. E. Nov. 29. [*Provisional protection only.*]

Sounding-apparatus.—Consists of a hollow metal ball, strong enough to resist the pressure of water at great depths, and large enough to float the whole apparatus, and having a vertical rod attached to it from beneath. The rod is fitted with a vaned rotator connected with indicators actuated during descending and ascending respectively. A tube greased at its lower end, or provided with a clip to bring up specimens of the sea-bottom, is suspended from the lower end of the rod. The upper part of the tube contains a glass bottle or vessel, with a stopper freely held a little above its mouth, the rim of the stopper being curved inwards to direct water into the bottle in its descent, whilst in its ascent the stopper is pressed into the bottle. Weights are attached by catches to the outside of the tube, which upon touching the bottom, is detached from the weights and allowed to rise to the surface.

2987. Dœring, F. B. Nov. 30.

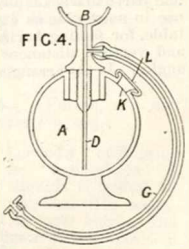
Surveying-instruments; levels. — A level or other instrument is mounted on gimbal joints, each motion being regulated, as shown, by an arc and tangent screw.



3047. Newton, W. E., [*Chazelles, J. A. E.*]. Dec. 6.

Bubbles, apparatus for blowing.—The solution is placed in a bottle A, fitted with a stopper, through which a tube D depends. This tube opens at the top to a cup B. The bottle is also provided with an opening K, fitted with a stretched cover L. When this cover is pressed inwards, a little of the solution is forced up into the cup B to be blown into a bubble by air blown through

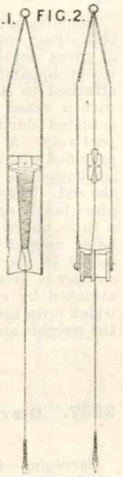
FIG. 4.



the flexible tube G. In a modification, the solution is forced into the cup B by inverting the bottle. A piece of flannel stretched on a ring may be employed for catching the bubbles.

3079. Baker, A. Dec. 12. [*Provisional protection only.*]

FIG. 1. FIG. 2.



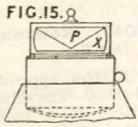
Logs; sounding-apparatus.—For sounding purposes, a buoy, Fig. 1, connected to the ship by a line, carries a fixed tapering reel from which the sounding-line unwinds as shown; or the reel may be replaced by a cylinder containing successive coils of line with an indicating arrangement to show the number of coils unwound. As shown by Fig. 2, the sounding-line may be coiled on a small drum. The buoy may be used directly as a log; or it may be used to cause a reel to travel along a stretched rope by the side of the ship, the time of travel being timed to determine the speed.

3086. Cullingford, W. H. Dec. 13. [*Provisional protection only.*]

Thermometers.—Adjustable index hands are provided.

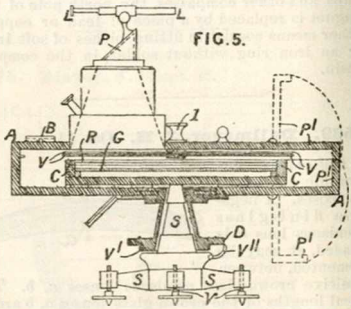
3119. Chevallier, F. A. Dec. 16.

FIG. 15.



Plane tables; lenses; reflectors.—Relates to photographic apparatus for obtaining panoramic views, and particularly adapted for use in surveying as a plane table, for finding horizontal and vertical distances and angles. In the arrangement shown in Fig. 5, the optical apparatus, consisting of a reflecting-prism P above the object-glass of a camera, is carried by a dark chamber A mounted to turn on a conical pivot S supporting a frame C with a sensitive plate or surface G and shutter R. Radial shutters V on a pivot I admit a beam of light from the camera to the plate G, and the chamber A is rotated continuously or intermittently by a tangent-screw V, a spring or weight motor, or by hand, to obtain a complete panoramic picture. The apparatus is fitted with a telescope L, a compass B, a level levelling-screws *v*, a graduated disc D and vernier V^{II}, and movable flaps P^1 to admit the frame C. Two hairs or threads, arranged at right-angles to one another in the slit between the shutters, indicate the horizon and the direction of vertical lines. The shutters may be operated by a rack and pinion, or sliding rods, and pins sliding in slots, and may be mounted between central semicircular guide-plates. The width of the slit is indicated by the operating-rods and

FIG. 5.



external scales or verniers. A segmental view of a portion of the horizon, or a circular view of the whole horizon, is thus obtained, with the tops of the trees &c. at the circumference or towards the centre of the picture. The dark box A may be fixed, and the optical apparatus mounted to rotate on it. Fig. 15 shows a conical reflector P and lens X for taking in the whole horizon and photographing it in one operation. The optical apparatus may be arranged below the dark box, and the sensitized plate may be protected by yellow glass to allow the operator to follow the image and control the operation. The apparatus may be mounted to rotate on a horizontal axis, and the prism may be replaced by a plane reflector.

A.D. 1865.

55. Galloway, G. B. Jan. 7.

Telescopes.—Telescopic and other tubes with observation glasses are applied to motor road vehicles, railway engines, and guards' vans.

Spectacles; eye-protectors.—Engineers' and guards' caps have glasses fitted in the peaks. Similar glasses may be fitted in light flexible frames and may be secured to the head by elastic bands.

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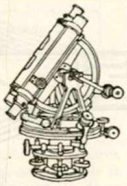
70. Bidder, B. P. Jan. 9.



Theodolites.—A pair of reversed and parallel telescopes are employed.

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75. Ladd, E. W., and **Oertling, L.** Jan. 10. [*Provisional protection only.*]

Specific-gravity estimating-apparatus. — The weights used in Syke's and other hydrometers are made of metallic alloys having such a composition as to give each of the weights "a desired specific "gravity, the object being to employ such alloys "of various specific gravities as shall regulate "the bulk of that portion of the hydrometer "which is immersed in the liquid, and thereby "insure accurate indications."

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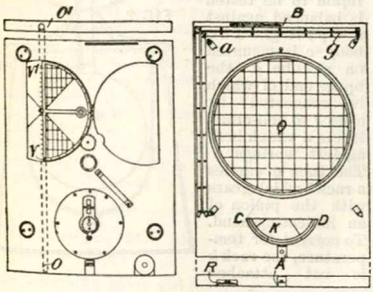
84. Lendy, A. F. Jan. 11.



913

Surveying-instruments; angle-measuring instruments; compasses, magnetic; levels.—Relates to a surveying-instrument applicable as a drawing-board, a plane table, a prismatic compass, a level, and a clinometer. On the upper surface of a metal or wooden table a sheet of transparent paper is stretched by means of grapples *a*. A circular protractor Q, a prism A and sight vane B, and grooves *g*, in which a sight ruler is inserted, are also provided on the upper surface of the table. Within an opening C D a prismatic compass is mounted. The protractor Q has two scales ruled at right-angles to each other upon it, by means of which surveys may be made to two or more scales. To protract bearings, the protractor Q is turned until the index is above the azimuthal angle on one of the scales. The direction is then drawn by tracing the line of the scale passing through the point of station. When the instrument is used as a plane table, the sight-ruler is withdrawn from its scabbard R and inserted in the grooves *g*. To find a station, a movable index K is fixed opposite one of the radii falling within the opening C D. The under surface of the table is provided with a clinometer consisting of a movable metal semicircle, which carries two pins *v*, v^1, and a fixed semicircle divided by equi-distant vertical and horizontal lines. To obtain a horizontal direction, the instrument is held in a vertical position so that the pins *v*, v^1 and holes o^1, *o* which run through the length of the board parallel to the line of sight through the prism A and vane B, are in line. The two holes *o*, o^1 are then in the same horizontal plane. To ascertain the angle of elevation or depression, the instrument is held so that the holes o^1, *o* and the object are in line. The protractor is then fixed by a spring and the angle read off. To find the horizontal projection of a distance on a slope, the metal semicircle is adjusted so that the index is over the graduation corresponding to the angle of the slope. The vertical lines passing through the marks on the diameter of the metal semicircle give the horizontal projection. The instrument similarly enables differences of altitudes to be taken and contours constructed. The table may be carried by the hand or mounted on a tripod.

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122. Brooman, R. A., [*Valson, C. A.*]. Jan. 14. [*Provisional protection only.*]

Alcoholmeters; specific-gravity estimating apparatus.—The strength or "composition" of alcohol and other organic liquids is tested by means of a capillary tube provided with scales, one of which is graduated to read heights and the other calibrated to indicate the composition of the liquid directly. The tube is held in a frame set in a cover on the vessel which contains

the liquid, and a thermometer indicates the temperature. The vessel is always filled to the same level, which is the zero of the scale of heights.

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128. Lilley, J. Jan. 14. [*Provisional protection only.*]

Compasses, magnetic.—To give steadiness and precision to the magnetic needle or indicator, another magnetic bar or needle is suspended beneath it in spirit or other liquid that does not easily freeze. The lower magnet is sufficiently powerful to control the upper needle completely. It is suspended on a central pivot by means of a "centre cone," and an adjustment is provided by which it may be lifted off its pivot, and the upper portion of the cone pressed and held against a support provided for it.

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207. Haseltine, G., [*Nyce, B. M.*]. Jan. 24. *Drawings to Specification.*

Hygrometers for indicating the amount of moisture in a cooling-chamber for preserving food consist of a pair of scales or a pivoted lever, having on one side a dish containing a desiccating agent, and on the other a weight or a pointer, indicating by its rise and fall the slightest change of moisture in the chamber.

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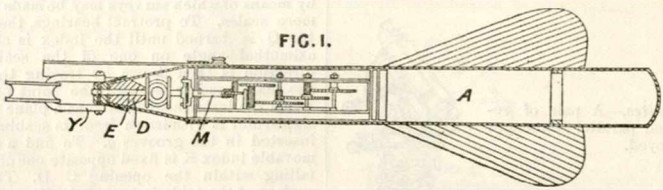
233. Massey, J. E. Jan. 26.

FIG. 1.



Logs; sounding-apparatus.—The log consists of a tube A with a conical head D, through which a shaft E, fixed to the shackle Y, passes. The shaft E is connected to a worm shaft M, gearing with a train of wheels which rotates with the log, whilst the shaft M is relatively fixed, The log may rotate in a frame. When used for sounding, a stop actuated by water pressure prevents rotation of the log during its ascent.

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235. Lüdeke, J. E. F. Jan. 27. *Drawings to Specification.* [*Provisional protection only.*]

Circle-describing instruments.—"For ascertaining the contents of a circle," a pair of compasses is provided at one point with a wheel, the periphery of which is graduated and fitted with short pins, so that on turning the compass, the wheel revolves and marks the measurements of the circular lines. Fine cuts are made in the wheel to prevent slipping.

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321. Markham, C. R., [*McIvor, W. G.*]. Feb. 6. *Drawings to Specification.*

Anemometers.—A set of coiled springs enclosed in an airtight casing, which revolves while the axle is fixed, is used to measure the force of the wind in a ship.

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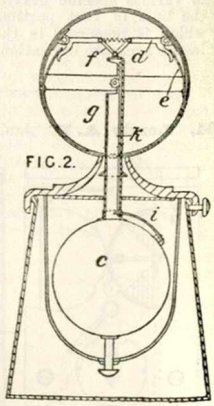
448. Hearsey, J. F., [*Payne, E.*]. Feb. 16

Specific-gravity estimating-apparatus.—Fig. 2 shows a section of a hydrometer, or saccharometer, in which the weight of a body immersed in the liquid to be tested is balanced against a spring. The body c is mounted on a tube *g*, the upper end of which is connected by arms *f* to bell-crank levers *d* which bear against springs *e* The tube *g* carries a rack *k* which gears with the pinion of an indicating-hand. To correct for temperature, the rack *k* is not attached

FIG. 2.



directly to the tube *g* but to the free end of a compound metal strip *i* attached to the body *c*. The rack may be replaced by a toothed sector.

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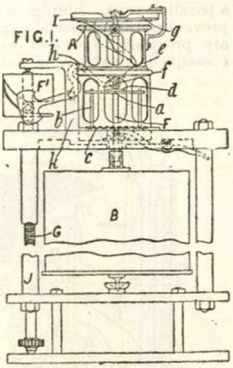
787. Arthur, W. March 21.

Compasses, magnetic.—Relates to apparatus for automatically recording compass indications. A recording drum B, mounted in a frame A, carries a disc *c* fitted with pins *b*. These pins engage with a cross-arm *a* on a shaft F which rises and falls under the action of a cam F^1 on a screw G. The cam works through a lever *h* pivoted at *k* and engaging by its inner end *f* between discs *d* and *e*. As the shaft F rises, a centre on its upper end engages with a compass needle or card *g*, and raises it from contact with the frame. The needle, thus set free to rotate, swings the card and with it a depending cam-like guide I. When the shaft F is again lowered, the card *g* is first brought into contact with the frame A, and fixed from rotating by friction. A radial arm on the shaft F then slides down the guide I and through the arm *a* and pins *b* rotates the cylinder B to follow the needle *g*. A marking-pencil is fitted to a carriage which slides on guides J under the action of the screw G. A clock-work-driven dotting pen may be employed.

FIG. 1.



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849. Barnes, R. W. March 25. [*Provisional protection only.*]

Reflectors; levelling-staves.—For examining sewers and tunnels, the light of a lantern at one point is reflected in any required direction by a reflector placed at another point. The lamp and reflector frame have holes in which slide rods, which are graduated for use as levelling staves. A cord fixed to the lamp or reflector passes over a pulley on the rod, to secure the lamp or reflector in any desired position. The reflector may be turned on its frame to any required angle by means of a screw. The rods are made in several pieces jointed together, and rigidly secured by internal bolts, the handles of which are flush with the surface of the rod.

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897. Baugh, B. March 30. [*Provisional protection only.*]

Reflectors for lamps and for reflecting purposes generally are made from iron or other metal which is first coated or covered with enamel or glass and then fired and afterwards platinized. To the materials employed in making the glass or enamel manganese oxide and white arsenic or arsenious acid may be added to give a purple colour and opacity respectively. Platinum bichloride solution is applied to the glass or enamel, which is again heated in an enamelling muffle.

1009. Prout, V. A. April 8. *Drawings to Specfication.*

Tripod stands for use with cameras for taking panoramic pictures. The tripod head consists of a circular plate having a series of notches in its edge. Detents on the base board of the camera can engage in the notches.

1205. Gutmann, J., [*Boudry, E.*]. April 29. [*Provisional protection only.*]

Telescopes and opera glasses; spectacles.—A small lens is fixed at the centre of the eye-glass of a telescope &c.; or the eye-glass may be formed "of two thirds of a concave glass and one third of a magnifying glass." A pair of small opera glasses may be mounted as a pair of spectacles.

1245. Stanley, W. F. May 4.

FIG. 1.

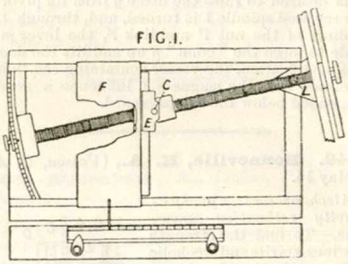
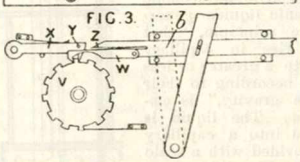


FIG. 3.

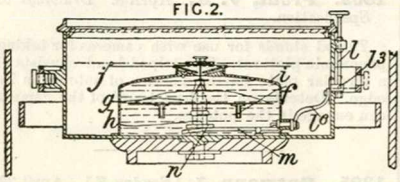


Dividing-engines for cutting scales and the like.—The slide F, Fig. 1, which carries the knife is traversed by a screw pivoted at L to enable it to be set at an angle to the bed to cut scales bearing no simple relation to the pitch of the screw. The nut is carried on the slide F by a pivot C and cross slide E. The screw may be rotated by a ratchet-wheel and variable-throw pawl. Fig. 3 shows an arrangement by regulating the lengths

of the readings of the scale divisions. The throw of a slide *b* which carries the ruling-point is controlled by a notched wheel V and detent X. The detent X is raised on every back stroke by an incline Z engaging a pin Y. A hooked pawl W advances the wheel V another notch on the next cutting-stroke which is limited by the thickness of the intervening tooth.

1251. Lilley, J. May 4.

FIG.2.

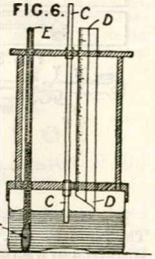


Compasses, magnetic.—Ships and other compasses are provided with powerful magnets adapted to turn freely, on a pivot, in a vessel of some liquid, such as spirit which does not easily freeze. The indicating-card is mounted outside the vessel. In the arrangement shown in Fig. 2, a pair of magnets *f* are mounted below a dome *g*, resting on a pivot *h* in the vessel, containing spirit, which is formed by the cover *i*. On the dome is a spindle supporting the indicating-card *j* and passing through the cover *i* which is formed with a sloping channel and cover for the return of liquid. When it is desired to raise the dome *g* from its pivot *h*, the screwed spindle *l* is turned, and, through the medium of the nut l^3 and link l^6, the lever *m* is made to force the "cone" *n* up and lift the dome. In a modification, the vessel containing the liquid is closed and the magnets *f* influence a needle suspended below the compass card.

1349. Bonneville, H. A., [*Valson, C. A.*]. May 15.

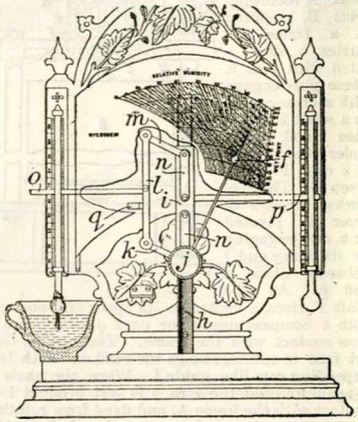
Alcoholmeters; specific-gravity estimating-apparatus.—To find the strength of wines, spirits and alcoholic and organic liquids generally, the principle, "that "fluids rise in capillary "tubes to a greater or less "height according to their "specific gravity," is employed. The liquid is aspirated into a capillary tube provided with a scale or scales. Fig. 6 shows one form of apparatus used, C being the capillary tube, D the scale, and E a thermometer.

FIG.6.



1610. Edson, W. June 14.

Hygrometers and hygroscopes.—A wet and dry bulb hygrometer is furnished with a card arc pointer arranged so that the pointer may be made to indicate the dew-point, the degree of saturation, and the absolute amount of moisture in the air, directly. On the stand supporting the thermometers is fixed a guide-piece *h*, on which a slide *i* can be adjusted. A pointer *f* and an arm *k* are rigidly fixed to a knob *j* pivoted to the slide *i*, and arms *l*, *m*, with the arm *k* and the slide *i*, complete a parallelogram. Springs *n* can be adjusted to prevent the arms from falling, by friction. Stops *q* are provided to prevent excessive motion and consequent breakage. Pointers *o* and *p* are fixed

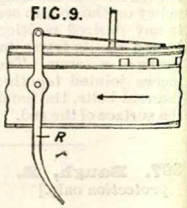


on the arm *l* and the slide *i*. The card is marked out by the aid of tables, a movement of the pointer *f* alone altering only the point marked on the wet thermometer by the pointer *o*, while a movement of the slide alters the indication of the pointer *p* on the dry thermometer. Thus when the scales are completed, if the slide is shifted till the pointer *p* comes to the top of the mercury column in the dry thermometer, and the knob is then turned till the pointer *o* comes to the top of the level in the wet bulb thermometer, the pointer *f* will immediately indicate the various quantities mapped out.

1731. Cox, J. June 29.

Sounding-apparatus.—A rod R, preferably elliptical in section with the sharp edge forwards, is suspended from or pivoted to the side of a vessel, and kept vertical by means of a stay, rod, or rope. When the vessel enters shallow water the rod strikes the ground, and snaps the rope, or rings a

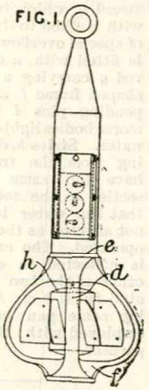
FIG.9.



bell, or otherwise gives warning. If preferred, the rod may be passed down through a hole or otherwise, while several rods may be used.

1830. Massey, F. July 11.

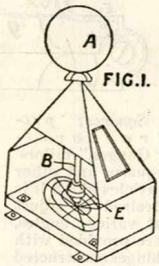
FIG. 1.



Logs.—The boss *h* of the rotator is fixed to the axis of the endless screw of the counting-apparatus, and is protected and steadied by curved stays *d* connected to bearing sockets *e*, *f*.

1839. Howlett, S. B. July 12.

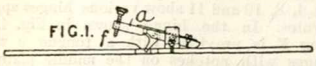
FIG. 1.



Anemometers; wind vanes.—The wind, acting against a ball A working on gimbals, rocks an attached rod B, the lower end of which carries a pencil to automatically register the direction and force of the wind on a chart E. The ball A may be fixed near the pencil-carrying end of the rod B. The chart may be driven linearly by clockwork.

1854. Clark, G., [*Morales, G. de*]. July 14. [*Provisional protection only.*]

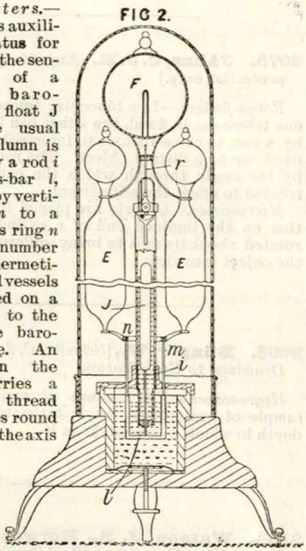
FIG. 1.



Squares; section-lining apparatus.—To facilitate the drawing of parallel and equi-distant lines, a set-square is fitted with a pivoted lever *a* to which is pivoted a spring catch *f*. This catch, when the lever *a* is depressed, engages with the paper and pushes the square forwards a small distance depending upon the play of the lever *a*.

1891. Clum, H. A. July 20.

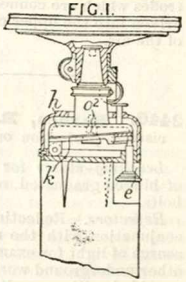
FIG 2.



Barometers.—Fig. 2 shows auxiliary apparatus for increasing the sensitiveness of a mercury barometer. A float J within the usual mercury column is attached by a rod *i* to a cross-bar *l*, connected by vertical rods *m* to a ring *n*. This ring *n* supports a number of light hermetically-sealed vessels E, F guided on a rod *r* fixed to the top of the barometer tube. An upright on the ring *n* carries a stretched thread which passes round a pinion on the axis of an indicating-hand working over a dial.

2065. Budenberg, A., [*Jähns, C. J. R.*]. Aug. 9.

FIG. 1.



Surveying-instruments; levels; theodolites; tripod and like stands.—For adjusting levels and other instruments, a plane or collar works on a horizontal hinge or wedge, or otherwise, and may be adjusted by means of a vertical screw opposite the hinge or wedge. On this plane or collar works another plate, disc, block, or collar, with one face parallel to that of the lower plane and the other inclined to it. The upper block is turned till the horizontal lines on its upper face, indicated by a spirit level, are parallel to the hinge. The vertical screw is then turned till the whole

upper face is horizontal. Fig. 1 shows one form of apparatus in which the screw *e* has a ball head, and the upper block *h* and lower plate *k* are connected by means of a pin o^2 with a hemispherical head. In another form, the socket of a theodolite or other levelling or surveying instrument is screwed to a hollow cylinder with an upper oblique face turning in a plate adjustable about a hinge.

2075. Jähns, C. J. R. Aug. 10. [*Provisional protection only.*]

Range-finders.—In a binocular telescope, whilst one telescope is fixed, the other can be operated by a cam to cause its axis to intersect that of the fixed one on a distant object. The range is given by the angle through which the cam has to be rotated to effect the adjustment.

Microscopes.—Objects are placed for examination on the inclined end of a cylinder which is rotated about its axis to bring different parts of the object into view.

2098. Bünger, W., [*Schmitz, C. J.*]. Aug. 14. *Drawings to Specification.*

Hygroscopes.—The amount of moisture in a sample of grain, seed, &c. is estimated from the depth to which a cone sinks in it.

2144. Watson, J. S., Horwood, A., and **Brumfit, C.** Aug. 19. [*Provisional protection only.*]

Thermometers for use in connection with automatic electric fire alarms, are constructed with a reservoir and an expanding chamber in a vertical position, connected by an inclined tube, to a receiving-chamber above, containing two electrodes which are connected on the mercury being driven into the upper chamber by the expansion of the air.

2446. Barnes, R. W. Sept. 25. [*Provisional protection only.*]

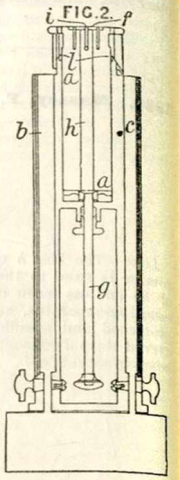
Levelling-staves for underground use consist of hinged graduated rods kept rigid by internal bolts.

Reflectors.—Reflecting-apparatus for use in conjunction with the magnesium light or other source of light for examining sewers, tunnels, or other underground works, consists of a framework, provided with a cavity for a rod to be passed through, in which a reflector is mounted so as to to be adjustable on its axis by a tangent screw or other means.

2490. Bennett, A. M. Sept. 28.

Specific-gravity estimating-apparatus.—Fig. 2 shows a section of apparatus for determining the volume of an immersed body by the overflow from a vessel already full. The middle vessel *a*, which to start with is filled to the level of special overflow lips *l*, is fitted with a central rod *g* carrying a cross-shaped frame *f* and depending pins *i* to immerse bodies lighter than water. Strips *h*, depending from the frame *f*, have the same cross-section as the rod *g*, so that the water level is not affected as the rod is operated. The overflow is collected in one or other of the two graduated tubes *b c*. A floating scale pan may be employed with the apparatus.

FIG. 2.



2613. Nicholls, A. Oct. 10.

FIG. 4.

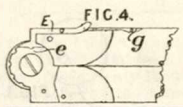
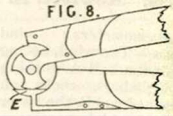


FIG. 8.



Squares; protractors.—"Gauges," tailors' squares and other articles which it is desired to adjust at various angles, are provided with hinges constructed to retain the articles in various positions. The middle plate or piece of the hinge is polygonal, or of a similar shape, and moves against a spring which holds the spring in position; or a screw passing through the middle plate holds the hinge. Figs. 4, 8, 10 and 11 show various hinges applied to rules. In the hinge shown in Fig. 4, the spring E is provided with a tongue *e* which engages with notches on the middle plate, the spring *g* pressing the "thumb spring" E against this plate. In the hinge shown in Fig. 8, a single spring E is used. Figs. 10 and 11 show a hinge graduated to show the angle to which the limbs

FIG. 10.

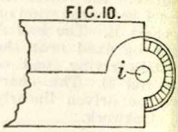
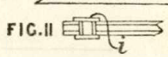


FIG. 11



are opened out, the rule being held in this position by a screw *i* with a milled head, which is gripped by a recessed screw in the middle plate.

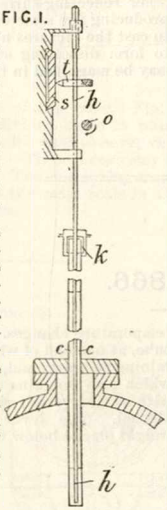
2714. Cooke, T. Oct. 20.

Barometers, aneroid. The usual chain in the transmitting gear is replaced by a thin band or wire of ductile metal.

2780. Gossage, F. H. Oct. 28.

Thermometers and pyrometers, fusible-metal type. A tube c, containing a small quantity of a fusible metal projects into the space of which the temperature is required. A rod *h* dipping into the metal is employed to determine whether the metal is melted or not. By the use of a number of different metals, melting at different temperatures, the temperature of the space can be determined. The tube c may be partly filled up with charcoal &c. to prevent oxidation of the fusible metal; or the top of the tube may have a cap *k* hydraulically sealed. To register the temperature automatically, a rotating shaft *o* engages by projecting springs with the rod *h* intermittently and raises the free ones which mark by pencils *t* a travelling band *s*.

FIG. 1.



2815. Solomons, S. Nov. 1.

Magic-lantern apparatus. — Magic-lantern, phantasmagoria, and like transparent slides are produced by chromolithography, using transparent colours instead of the ordinary colours. An impression is taken upon a sheet of gelatine or other transparent material, which is afterwards mounted upon or between sheets of glass in a frame; or an impression is transferred to glass and varnished.

3083. Handley, I. J., and **Wilkins, C.** Dec. 1. [*Provisional protection only.*]

Compasses; dividers; joints.—The usual rivet is replaced by a screw and wing-nut.

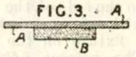
3167. Bonneville, H. A., [*Fabre, T.*] Dec. 9. [*Provisional protection only.*]

Barometers.—The barometer tube containing mercury or other non-volatile liquid, is open at the top and bent at the bottom where it is connected to a reservoir containing air or gas. Taps may be arranged between the reservoir and the tube.

3193. Griffin, J. T., [*Schramm, G.*]. Dec. 11.

Rulers.—A flexible ruler, which will adapt itself to the contour of a book or other surface, is shown in transverse section in Fig. 3, and consists of an upper strip A of hardened rubber or ebonite, brass, steel, horn or other material, attached to a narrower strip B of vulcanized rubber or other suitable material. The strip B serves to raise the ruling-edges of the strip A clear of the paper or surface to be ruled.

FIG. 3.



3211. Beck, R. Dec. 12. [*Provisional protection only.*]

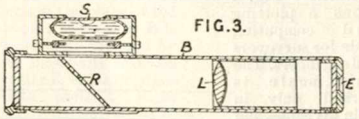
Microscopes, vertical illuminators for. To illuminate an object under observation, light entering by a hole in the body of the instrument is deflected downwards by a thin glass disc through the objective by which it is concentrated upon the object.

3283. Clark, W., [*Andrews, S.*]. Dec. 19. *Drawings to Specification.*

Levels.—To determine the inclination of the car of a balloon, small balls or marbles are adapted to run in grooves in the curved bottom of the car.

3316. Newton, W. E., [*Davidson, G.*]. Dec. 22.

FIG. 3.



Sextants, quadrants and the like; telescopes; levels.—A spirit level S, Fig. 3, is mounted on a tube B, fitted with a reflector R, and a half lens L, at the focus of which the level occurs. To an eye placed at the end E an image of the bubble of the level is seen optically projected upon a distant object. A horizontal line for levelling can thus be determined. The level may be fitted to sighting telescopes such as those used with sextants &c. Cross wires fixed below the level, are sighted with the bubble when the horizon is not available.

3329. Haddan, J. C. Dec. 23. [*Provisional protection only.*]

Levels; theodolites.—To adjust levels and theodolites, the diaphragm, carrying the hair line, is arranged to be turned round in the telescope, without turning round the instrument, by means of a single adjusting-screw and a spring. Where both vertical and horizontal adjustments are required, motion is provided in two directions at right-angles to each other by means of two screws and springs fitted to the diaphragm. To indicate whether the instrument is out of adjustment without trial, two bubble tubes are arranged parallel to the axis of the telescope. One tube is fixed with reference to the telescope and the other is a fixture on the frame carrying the telescope. The correct adjustment is indicated by the bubbles being at their fiducial marks, when the telescope is turned round. In Y-levels and the like one bubble tube instead of being a fixture moves parallel with the axis of the telescope. Levels are also constructed with two separate diaphragms, each being adjusted independently of the other.

3363. Baggs, I. Dec. 29. [*Provisional protection only.*]

Stereoscopes.—A square piece of plain plate glass is placed at such an angle, relative to two stereoscopic pictures contained in the instrument, that one of the pictures may be seen directly through the glass, whilst the other is seen by reflection from the surface of the glass. By shutting out the light from either picture, and illuminating the other, the first is caused to disappear or dissolve, and the other to take its place on the organ of vision. Two or more mirrors or other reflecting-surfaces may also be used for producing the same effect. Lenses may be used to cast the pictures upon a screen or in the air, to form dissolving stereoscopic pictures, which may be magnified in the well-known manner.

A.D. 1866.

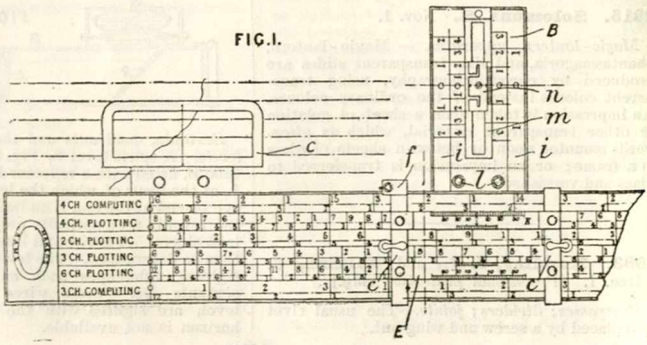
76. Shaw, R. Jan. 10. [*Provisional protection only.*]

Thermometers.—Temperature is recorded on a moving sheet of paper by a pencil attached to a lever having at its ends vessels containing mercury and alcohol, the expansion and contraction of which causes the lever to turn on its axis as the temperature changes. Upon the lever is fixed a tube, at one end of which is an open vessel containing mercury, and, at the other end, is a vessel, which also contains mercury, and communicates with a third vessel, which is closed and filled with alcohol. The lever is counterbalanced by a weight placed below the level of the lever.

90. Dean, H. Jan. 11.

Scales. — Fig. 1 shows a plotting and computing scale for surveyors and engineers. The main scale is marked only in main divisions, and short subdivided scales E are provided, screwed to cross bars c which are attached to pieces sliding in grooves in the sides of the main scale. A projection *f* from one of the cross-bars c carries a pricker, Fig. 7, consisting of

FIG. 1.



a needle held up by a spring *h* and depressed by pressure on its head. From one of the pieces sliding in the groove in one of the sides of the scale, a piece *i* projects, and carries the offset scale B, which is fastened to it by screws *l*. This scale is provided with a central subdivided scale *n* sliding in grooves *m* and provided with a pricker,

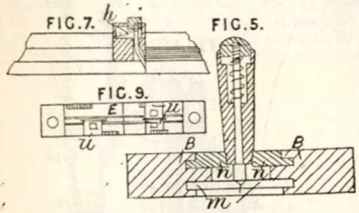


Fig. 5, opposite the zero of the scale. Fig. 9 shows another form of subdivided scale in which small plain hinged pieces *u* are used to cover that part of the scale not in use. These pieces may be used on any of the scales. The computing-frame C, Fig. 1, is mounted on the main scale in the same way as the offset scale.

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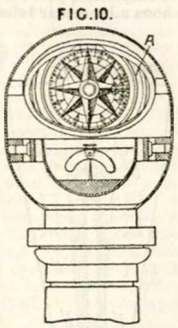
227. Hopkins, E. Jan. 23.



Compasses, magnetic.—The binnacle is removed from the magnetic disturbing influence of the steering-wheel and fitted with a reflector A to render the readings visible at a distance. The compass needle is built up of curved or arc-shaped pieces. The iron hulls of ships are demagnetized by being rubbed from stem to stern with electromagnets.

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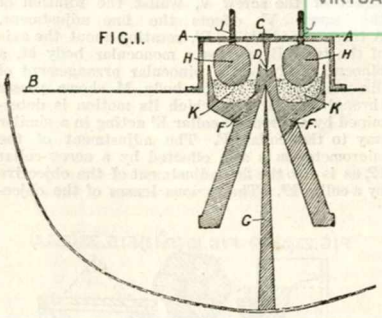
353. Renney, W. Feb. 5.

Compasses, magnetic.—To prevent oscillation and vibration of the card B of a ship's or other compass, the supporting-bridge A carries vanes H, clamped in vertically-adjusted position by screws J and dipping into liquid K in a cup F. This cup is supported on a central pivot G and has a recess D to receive the end of the card pivot C.

(*For Figure see next column.*)

353.



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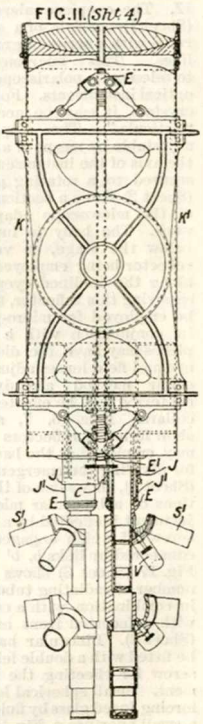
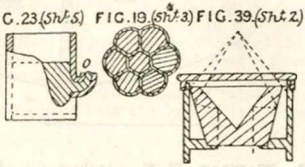
473. Newton, H. E., [*Jaubert, L.*]. Feb. 14.



Microscopes &c.; adjustments; micrometers, optical. — Fig. 1 (Sheet 1) shows a vertical section. The body is hinged to the top of a telescopic standard K, K', carried by a foot S. The tube B, upon which the stage P slides and which carries the observing-apparatus, slides in a collar A' attached to a head D and free to rotate about an axis A, normal to the plane of the paper. Rotation about this axis is regulated by a circular rack and pawl R. The head D is also free to rotate in a collar *h* about an axis in the plane of the paper. The tube B is raised and lowered by an internally-screwed collar E, which engages with toothed racks secured longitudinally to the tube B, and forming an interrupted screw. The coarse and fine adjustment of the table P is effected by a differential screw arrangement. A long hollow screw V engages externally with the tail *n* of the table P, and internally with a finer screw V' working between centres. The

coarse adjustment is effected by the rotation direct of the screw V, whilst the rotation of the screw V^1 effects the fine adjustment. A three-armed fitting B^1, rotating about the axis of the tube B, carries a monocular body M, a binocular body, and a binocular arrangement of dissecting-lenses. The body M shown passes through a collar F in which its motion is determined by a threaded collar E^1 acting in a similar way to the collar E. The adjustment of the micrometer *m* is also effected by a screw-collar E^2, as is also the fine adjustment of the objective by a collar E^3. The various lenses of the objec-

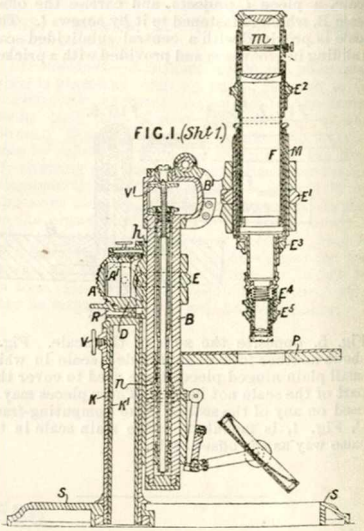
FIG.23.(Sht.5) FIG.19.(Sht.3) FIG.39.(Sht.2)



tive may be adjusted axially by screw-collars E^4, E^5. The eyepiece micrometer, shown in Fig. 11 (Sheet 1), consists of a screw-adjusted glass disc ruled with a series of graduated radial and spiral lines. This micrometer may be applied to telescopes, polariscopes, goniometers and other optical instruments. For measuring the angles of crystals, it may be accompanied by a movable "reticula." The diaphragm holder is made adjustable by means of a screw in the direction of the axis of the instrument. An object holder is secured to a rotating graduated plate. Fig. 1 (Sheet 2) shows a section of a modification of the microscope adapted for chemical work. The body is inverted and placed below the stage, a vertically-adjustable reflector being employed to direct the rays along the inclined eyepiece line T^1. By removing this reflector, the instrument may be employed for micro-photographic work in conjunction with a camera N. Eye-pieces may have the distance between the eye and field lenses adjusted by the screw-collar method already described, and centering may be effected by rotating cam collars. Figs. 6, 7, and 8 (Sheet 3), show forms of reflectors and prisms which may employed at the back of the objective for dividing the emergent pencils. Fig. 10 (Sheet 3), shows one of the various modications of a binocular microscope. The adjustment is effected by a central differential screw V^3 which engages with two collars connected by links *b*, b^1 to the tubes *t*, *t*. Fig. 17 (Sheet 3) shows another form. A number of radiating tubes may be employed in combination with a compound objective with a facetted front as shown by Fig. 19 (Sheet 3). Binocular hand-magnifiers may be fitted with a double left and right handed screw for effecting the inter-pupil adjustment. Small spherical lenses are made by forcing fused glass by fluid pressure through a small aperture *o*, Fig. 23 (Sheet 5).

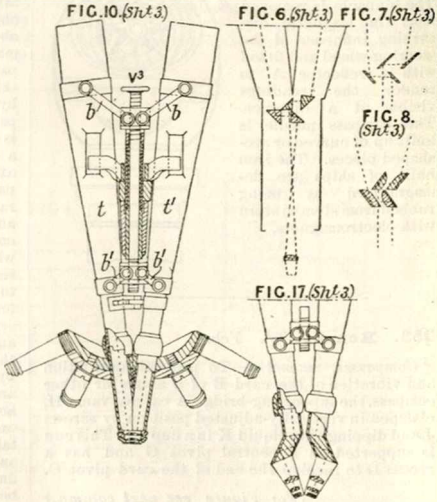
Telescopes.—Fig. 34 (Sheet 2), shows a reversing eyepiece which, by making the surface *c* concave, may form a Galilean telescope. Fig. 39 (Sheet 2),

FIG.1.(Sht.1)



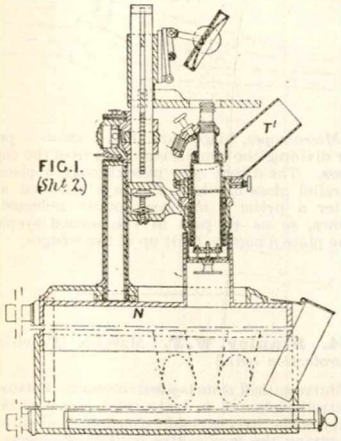
shows another form of lens. The lens surfaces may be ellipsoidal, paraboloidal, &c. Fig. 30 (Sheet 3) shows a binocular telescope, in which the axes of

FIG.10.(Sht.3) FIG.6.(Sht.3) FIG.7.(Sht.3)



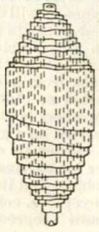
the tubes can be converged on an object by the operation of eccentrics R to produce a rotation about pins a. A form is also shown in which the inter-ocular distance as well as the convergency of the axes is adjusted. The object glasses of telescopes may be made compound in the same way as the microscope objective shown by Fig. 19 (Sheet 3). Total-reflecting prisms may be mounted at the periphery of the objective. Fig. 11 (Sheet 4), shows an under view of a binocular telescope. The distance between the two main tubes K, K^1 is regulated by a long screw V engaging with nuts

FIG. I. (Sht 2.)



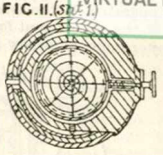
E, E^1 connected by links b to the bodies. Both the eyepieces and the erecting systems are mounted interchangeably so that the power may be varied, or by introducing a simple tube S^1 instead of an erecting system, an astronomical telescope may be produced. Focussing is effected by the sliding telescopic tubes J, J^1 operated by rackwork or otherwise. The telescope may consist of a single object glass combined with two adjustable eyepieces the pencils being divided by prisms. A telescope objective, built up in layers as described, may be combined with a weak negative lens to increase the focal length of the combination. This negative lens may also be applied to reflecting telescopes of the Newtonian type. Fig. 17 (Sheet 5) shows a section of a binocular reflecting telescope with a shortened physical length, as compared with the optical, and a magnified inter-objective distance. The rays from the reflectors (not shown) are deflected

FIG. 31. (Sht 5.)



into the eyepieces by prisms p, p^1. The arrangement may be adapted to reflecting telescopes of other types.

FIG. II. (Sht 1.)



Lenses.– Fig. 21 (Sheet 2) shows the various optical elements employed in the microscope, which may also be applied to optical purposes generally. "All the "improved lenses are composed of glass in simple "concentric layers, or in groups laid one upon the "other and rendered adherent or fastened together, "and arranged under conditions of thickness, "arrangement, curvative dimensions and powers "of reflection and dispersion ever variable from "the centre to the edge" to achromatise and render them free from aberrations. Prisms may be built up of layers in a similar way. Small spherical lenses are made by forcing fused glass by fluid pressure through a small aperture o, Fig. 23 (Sheet 5). For the purpose of forming lenticular masses of glass, built up of layers of, it may be, different optical properties, the apparatus shown at Fig. 24 (Sheet 5) is employed. Over a gas blowpipe c a cup g of platinum or fireclay is mounted on the upper end of a shaft B, driven by a pulley P. A lump of glass is placed in the cup g and then, whilst in a liquid state, it is rotated until it assumes the desired shape. A second or more lumps of different glasses are then treated in the same way. The glass is transferred from the furnace to the apparatus by means of a platinum brush through the handle of which gases are fed to a burner, which keeps the glass in a molten condition. Lenticular masses may also be built up by superposing plates and putting them into an annealing oven to cause them to adhere. A flux of white sand, minium, and calcined borax may be employed. The optical properties may be made to vary from the centre outwards by superposing cylindrical sheets, Fig. 31 (Sheet 5), and then drawing the mass out into a rod. Various substances may be interposed between the sheets.

FIG. 17. (Sht 5.)

FIG 24. (Sht 5.)

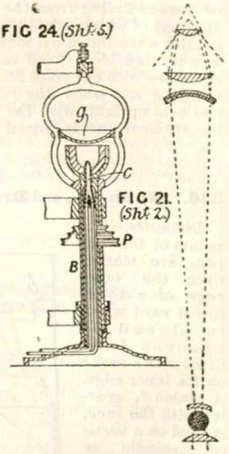


FIG 21. (Sht 2.)

Magic-lantern apparatus.—In optical projection apparatus (1) the lens may be built up in layers; (2) the adjustment for focussing may be effected by means of screw guides; (3) a rotary and

FIG. 30. (Sht. 3)

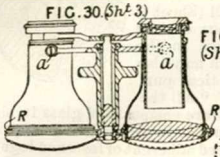
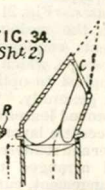


FIG. 34. (Sht. 2)



reciprocating motion may be given to the object holder. The same apparatus on a larger scale may be employed for photographic enlarging.

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534. Lake, W. R., [*Martin, B. G.*]. Feb. 21. [*Provisional protection only.*]

Angle-measuring instruments; plumb-rules.—A pocket rule of folding type and provided with a swinging arm for use as a plumb level and with an index pointer so that any inclination or angle may be measured thereby. A short arm pivoted near one of the first folds of the ruler serves as the plumb level, and its free end is made wider and heavier and is pointed. One end of the index pointer is attached near the middle joint close to the edge of, and near the same section as, the plumb piece, the other end being attached to the corresponding section of the rule by a double-headed screw passing through a longitudinal slot. The index consists of a curved line and a number of lines radiating from the pivot of the pointer, the first of which coincides with the edge of the pointer when the rule is folded. Upon the pointer is a pointed block fixed so that its upper point coincides with the point on the lower end of the swinging arm when the ruler is opened to 45° and held upright, with the section on which the longitudinal arm is formed on a horizontal plane.

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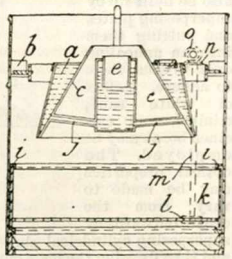
556. Nunn, W., and **Brown, C. W.** Feb. 23.

Binnacles,—The points of the compass are marked upon the outer edge of a cylindrical card which is placed in grooves *i* and fitted with a rack *k* on its inner edge. A pinion *l*, gearing with the rack, is fixed on a vertical spindle *m* which carries at its upper end a bevel-wheel *n* gearing with a second bevel-wheel *o*. The axis of the wheel *o* may be rotated by a key so that any point on the card may be brought before an opening in the casing. The lamp *a* to illuminate the card is suspended by means of a double swivel or gimbal *b* to prevent the oil from spilling.

FIG. 2.



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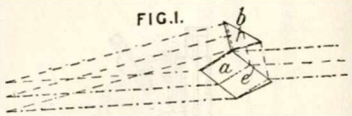
581. Lealand, P. H. Feb. 24.

FIG. 1.



Microscopes, binocular. Fig. 1 shows a prism for dividing the pencils emerging from the object glass. The direct rays pass through a piece of parallel glass *a*, whilst the rays reflected at *e* enter a prism *b* and are totally reflected, as shown, so as to pass to the second eyepiece. The plate *a* may be built up of two wedges.

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664. Stanley, W. F. March 5. [*Provisional protection only.*]

Mathematical drawing-instruments.—Relates to centrolineads and to instruments for describing epicycloids, hypocycloids, conchoids and ellipses, for giving the perspective position of objects by reflection, and for altering the perspective scale or taking the position of any three points. Epicycloids and hypocycloids are constructed by an instrument consisting of a frame, standing upon T-feet and supporting a bed which is pivoted at one end. Cog wheels upon fixed axles are geared into one another on this bed, and one end of a bar is carried on the second or third wheel. The pencil is adjusted upon this bar, which crosses over the axis of the instrument and is supported at the opposite end in a sliding fitting. The instrument for describing the conchoid is made with a T-shaped bed, so that the marking head may pass over the centre. The "heads," which are clamped and adjusted where required, may slide in grooves and may be clamped so that the instrument will describe a semi-ellipse. A centrolinead consists of a rectangular bed supported upon changeable wheels of different sizes upon one axis or by three wheels of similar size, which radiate from a centre. One of the bearings is adjusted so that the bed remains level when a large wheel is placed upon the axis and the pencil is carried on a graduated bar. One leg of a compass carries an eye piece and a mirror, and the other leg carries a half-silvered mirror, and when the object and its reflected image, as seen through the eyepiece, coincide, "the opening of the compasses" represents "the angle the two objects

"bear to each other," and their "positions may "be transferred to the paper by means of inter-"secting arcs." In a beam compass, a joint is made at the centre and a point projected from the joint, so that the position of any three points may be obtained by the compass, or it may be applied to alter the perspective scale.

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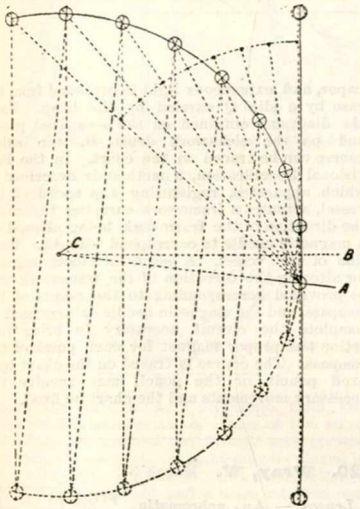
723. Humphreys, H. T. March 9.



Railway and like curves, setting-out ; clinometers.—Relates to reflecting-apparatus for laying out curves in surveying operations, for determining angular altitudes &c., and for goniometric work. The apparatus consists of a short cylinder which is fitted at one end with a fixed plane mirror A normal to the axis, and at the other end with a similar mirror B, half silvered and adapted to rotate about an axis at right-angles to the axis of the cylinder. The first mirror carries an eyehole through which an object can be observed. When this is done, the images seen in the half-silvered and inclinable mirror appear on a circle struck from the vertical point of intersection C of the mirrors. The apparatus may be combined with a telescope &c.

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749. Newton, A. V., [*Moën, H. A. R.*]. March 12. [*Provisional protection only.*]

Levels and plumbing-instruments ; clinometers.—An instrument which serves as a level, and also to test the perpendicularity of surfaces, consists of a metal frame, provided with a segmental recess in which is pivoted a cylindrical case which maintains a vertical position. A wooden cylinder, carrying a graduated dial provided with a pendulous index hand, is arranged concentrically within the cylindrical case, in the upper side of which is a hole, covered with glass, for inspecting the index hand. The base of the metal frame is a true plane.

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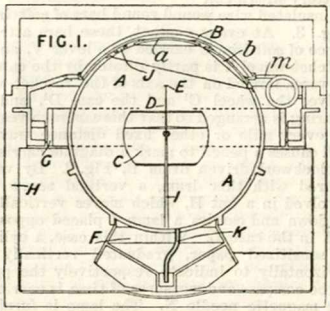
838. Henry, M., [*Normand, J. A.*]. March 21.

FIG. 1.



Compasses, magnetic.—A mariner's compass, the action of which is independent of the pitching and rolling of the vessel, comprises a hollow sphere A supported by gimbals G in a box H, and filled with liquid, preferably linseed oil and essence of petroleum, in which floats a light aluminium plate C pivoted on a rod I. The plate is in the form of part of a sphere and carries a compass card. The liquid is introduced through an opening closed by a stopper J and communicates through a pipe K with a reservoir F partly filled with air.

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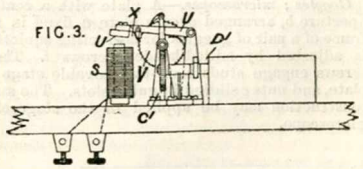
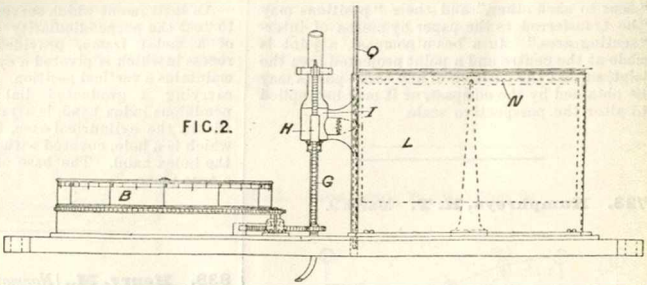
843. Chatwood, S., Sturgeon, J., and **Sturgeon, T.** March 21.

FIG. 3.



Logs; course recorders. — Relates to means for obtaining the rate and the direction of progress of a vessel so that the course may be marked on a chart. During every revolution, or during a fixed number of revolutions of the axis of a ship's log, contact is made between the ends of copper wires connected through a battery with a coil of insulated wire wound round bars of soft iron S, Fig. 3. At every contact, these bars attract a piece of soft iron U carried on a lever V, and the ratchet-wheel Y is partly rotated by the catch X. A worm, formed on the axis of the ratchet-wheel, drives the wheel C^1 and the cam D^1, and the gearing is arranged so that this cam revolves once for every mile or other fixed distance travelled and causes a pencil to mark a diagram carried on a clockwork-driven drum B, Fig. 2. By wheels geared with this drum, a vertical screw G is revolved in a nut H, which moves vertically up or down and carries a lamp I placed opposite a slot in the case L. Within this case, a cylinder of sensitized paper, graduated vertically and horizontally to indicate respectively the points of the compass and measures of time, is carried by the magnetic needle N. The lamp is furnished with a lens to focus the rays upon the sensitized paper, and extraneous light is excluded from the case by a slip Q carried by the lamp. From the diagrams obtained on the sensitized paper, and on the clockwork drum B, the ship's course can be traced on the chart. In the Provisional Specification, a method is described in which apparatus, registering the speed of the vessel, actuates a framework carrying the chart, the direction of the framework being altered by a magnetic needle to correspond with the direction of the vessel. A series of electromagnets for altering the direction of the framework may be provided corresponding to the points of the compass, and the magnetic needle is arranged to complete the circuit necessary to bring into action the proper magnet for each point of the compass. The course is traced on the chart by a fixed pencil, or the pencil may receive the necessary movements and the chart be fixed.

FIG. 2.



890. Salom, S. H. March 27.

FIG. 1.

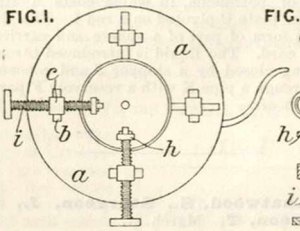
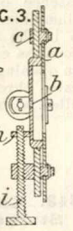


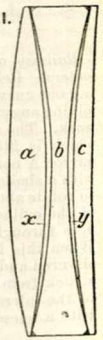
FIG. 3.



Goggles; microscopes.—A plate with a central aperture *b*, arranged over a plate *a* fixed in the frame of a pair of goggles for correcting squinting is adjusted by milled-headed screws *i*. These screws engage studs *h*, on the movable stage or plate, and nuts *c* sliding in guide slots. The same construction may be applied to the stage of a microscope.

920. Wray, W. March 31.

FIG. 1.



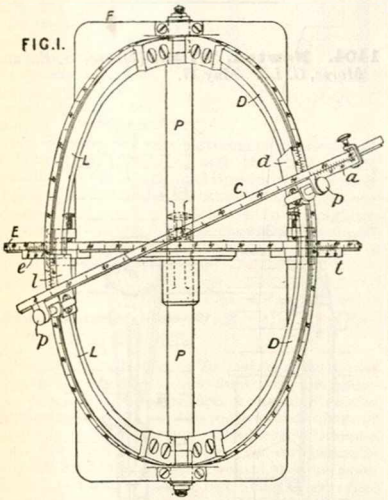
Lenses. — An achromatic object glass for a microscope, telescope, or the like, is composed of one or two crown glass lenses *a*, c and a flint glass lens *b*, intermediate lens-shaped spaces *x*, *y* being filled with cement preferably consisting of oil of cassia with Canada balsam or castor oil. Oils of cloves, bitter almonds, cummin, and Barbadoes tar, castor oil, creosote, the balsams of Tolu, Peru, and styrax, copal, dammar, and benzoin gums, carbon bisulphide, and boro-silicate of lead, may be used.

946. Rowan, J. M., and **Morton, A.** April 3.

Latitude and longitude instruments.—Latitude, longitude, and Greenwich mean time are deter-

mined from one another, and the altitude of the sun or a star and its position in the heavens as given in the Nautical Almanac, by the apparatus shown. An equatorial ring E and two adjustable latitude arcs L, D are mounted in a polar spindle P carried by a frame F. An altitude arc C has two pins *p* to engage verniers *l*, *d*. *a* arranged as shown. Verniers *t*, *e* also are provided. In deter-

FIG.I.



mining the latitude and longitude from two altitudes of the sun or the altitudes of two stars, a third latitude arc and two altitude arcs pivoted together may be used. A globe may be placed in the centre of the instrument. In a modification, a fixed latitude segment and a loose latitude segment with clamping-screws, are carried by a spindle, the altitude arc being used as an equatorial ring also.

1006. Thomson, R. W. April 9.

FIG. 8 FIG.10 FIG.I.

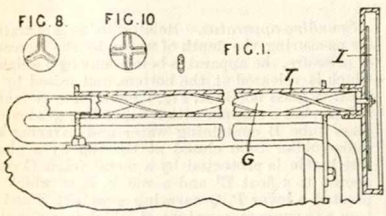
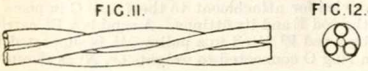


FIG.II. FIG.12.



Barometers. — The atmospheric pressure is applied inside or outside of a twisting hollow strip G, Fig. 1, of brass, glass, or other resilient material. One end of the strip is fixed in the casing T of the instrument; the other end is free and carries a pointer I in front of a dial, or carries a toothed segment in gear with a pinion on the shaft of a pointer. Increasing pressure in the hollow strip G causes it to untwist to some extent. In modifications, the hollow strip is replaced by tubes of other sectional forms, such as those shown in Figs. 8 and 10, or by a group of two or more cylindrical tubes arranged helically, as shown in Figs. 11 and 12.

1085. Gengembre, P. W. April 17. [*Provisional protection only.*]

Stereoscopes; graphoscopes.—A box to contain the roller which carries the slides or views of a stereoscope or graphoscope, is constructed in two parts, and the roller revolves in notches formed in the sides of the upper and lower parts. The roller, which may be reversed when the box is opened, is turned by knobs fitted at each end, and is prevented from turning backwards by a ratchet-wheel or other device. The slides or views which are kept in position by a spring may be arranged back to back, and are attached parallel to the roller by elastic loops fixed to two rings mounted at a suitable distance apart on the roller. A door, carrying the lens or lenses, is placed in the upper part of the box and provided with a reflector.

1105. Dales, C. April 19. [*Provisional protection only.*]

Spectacles and eyeglasses. — The frames of "shooting-glasses or hat frames" and other spectacles are provided with ball-and-socket joints. Each ball is carried by a stem or handle, and is clamped by a thumb-screw between the cupped ends of two short bars. The stem may be fixed in a hat brim or cap peak.

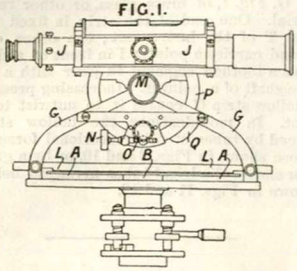
1202. Edgeworth, D. R. April 28.

Surveying-instruments. — In an instrument for enabling a survey to be plotted in the field, a platform A, having clips to secure a piece of drawing-paper in place, is supported by a pillar B, clamped in adjusted positions by a screw. A rotatory frame G carries a plotting-scale L and a telescope J, mounted on the pivot M and having cross-wires which intercept, on a levelling-staff, a length proportional to its distance. A scale P, having a vernier Q, a clamping-screw O, and a tangent screw N, is graduated to reduce inclined distances to horizontal distances.

(*For Figure see next page.*)

1202.

FIG.1.



1236. Benvenuti, F. F. May 2.

FIG.3.

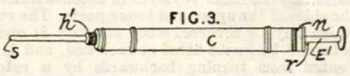


FIG.7.

Ruling and like pens.—Relates to a construction of holder for supplying ink or other liquid to a writing, drawing, or ruling nib. The holder consists of a tube C, Fig. 3, fitted at one end with a capillary outlet-tube S, and at the other end with a piston E^1, Figs. 3 and 7, operated by pressure, or with a piston operated by a screw cap. The tube S screws into the tube C, and is also provided with a screw-threaded portion h^1 to receive the nib. The tube C is filled from the lower end on removal of the tube S. The piston E^1 consists of two parts screwing the one on the other for adjustment of a cork F disposed on the lower part between a fixed stud *s* and a loose stud. The upper part of the piston is provided with a stop *r*. The tube C is fitted with a screw cap *n* slotted for the passage of the piston stem and stop.

1285. Rock, T. D. May 5. [*Provisional protection only.*]

Tripod and like stands.—The legs of a tripod stand, for telescopes and other instruments, are made of extra large diameter and provided with cavities for receiving the telescope, or other instrument, swivel holder, levels and other instruments. The legs are connected to a centre piece or cup, similar to the top of the stand, by stays or stretchers each consisting of two brass tubes, one sliding within the other and clamped in position by a binding-screw. The telescope, or other instrument, may be mounted on the lower centre-piece, when required to be used in a low position, or when the stand is to be closed up, in which position the swivel holder and stays rest in cavities in the sides of the legs. The cavities are suitably lined, and the whole stand and instrument are enclosed in an oilskin, or the like, for transport. The stand is applicable for supporting rifles or rockets.

1404. Newton, W. E., [*Morse, S. E.,* and *Morse, G. L.*]. May 17.

FIG.3.

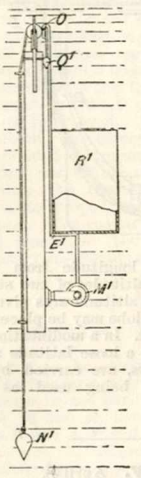
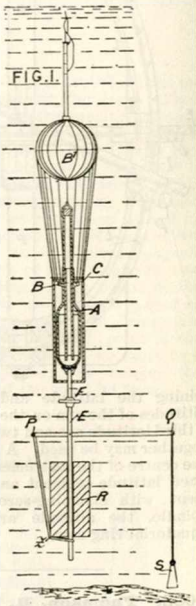


FIG.1.



Sounding-apparatus.—Relates to an apparatus for measuring the depth of water by the increase of pressure, the apparatus being sunk by a weight, which is released at the bottom, and raised by a float. A glass bottle A, Fig. 1, containing mercury and air, has a stopper with a depending graduated glass tube B containing water and carrying an india-rubber tube closed at the top by a plug. The bottle is protected by a metal frame C connected to a float B^1 and a rod F, E, to which is pivoted a lever P, Q carrying a weight S and a loop *z* to support a weight R which is automatically discharged. Fig. 3 shows a modified sinking-device for attachment to the frame C in place of the rod E and its fittings. A sand-box R^1, carried by a rod E^1 fitted to a pulley M^1, is supported by a ring O connected to weights Q^1, N^1 as shown.

1470. Weatherdon, B. F., [*Durand, J. J. M.,* and *Pichoin, C.*]. May 26.

Thermometers and pyrometers. — In a mercurial thermometer, two limbs are attached to the bulb, and, within each limb, two platinum wires are arranged so that electric circuits may be completed by the expansion of the mercury. One limb of a graduated U-tube, used as a thermometer, is connected to a platinum or other vessel containing dry nitrogen, and this instrument, according to the Provisional Specification, is used to determine "the temperature of any gas contained in a closed vessel." In a "weighing "pyrometer" expanding gas passes from a closed chamber *k*, Fig. 6, to a "weighing cylinder" *i* having a weighted piston *j*, j^1.

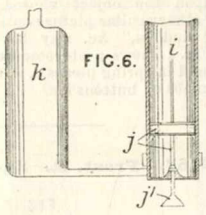


FIG. 6.

1510. Hammersley, W. R. May 30. [*Provisional protection only.*]

Compasses, magnetic. — To maintain an equal pressure in the bowl of a fluid compass under all variations of temperature, a circular elastic chamber is formed of two corrugated discs of metal connected by a rim, and placed within the bowl. The bowl is filled with fluid and hermetically sealed, a passage being established between the interior of the elastic box and the external atmosphere. In a modification, the compass bowl may be divided by a partition into an air and a fluid compartment; the former is connected to the external atmosphere and contains the elastic box which is filled with fluid and connected to the fluid compartment, so that the pressure necessary for the proper working of the compass, is maintained.

1541. Vaughan, E. P. H., [*Marshall, T. W.*]. June 2. [*Provisional protection only.*]

Reflectors.—Mica is used as a reflector or as a protective covering for a reflector. When used as a reflector, the mica is shaped in a mould and coated with a metallic surface.

1620. Hodges, R. E. June 14.

Rulers.—A ruler, Fig. 3, has the ruling edges a^1 and a^2 raised above the surface of the paper, and projecting forward from the body *a* of the ruler to enable lines to be ruled above lines of writing &c. without smearing the ink. The ruler is held by means of a handle *b*. One longitudinal and two end ruling edges are provided.

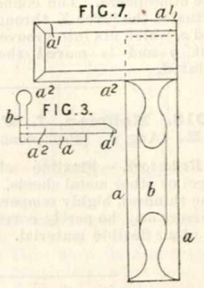
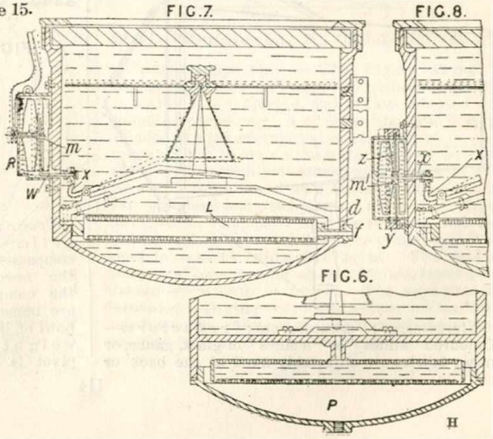


FIG. 7. FIG. 3.

Fig. 7 shows a modification applicable for ruling across cash columns in account books. When ruling on the left-hand cash column, the edge a^1 is used, the body *a* being supported on the right hand column. For ruling the right-hand column the position is reversed and the edge a^2 used, or a ruler with the ruling-edges extended on both sides of the body *a* may be employed. A modification for ruling close to the lower edges of books has a projecting part which serves as a support, during the ruling operation, and an additional ruling edge parallel to the edge corresponding to the edge a^1, Fig. 3.

1627. Hammersley, W. R. June 15.

Compasses, magnetic.—In fluid compasses the harmful effects of expansion and contraction of the liquid are prevented, and means provided for lifting the compass card without allowing access of air to the liquid. An elastic box L, Fig. 7, consisting of two corrugated metal discs united by metal rims *d*, is held by projecting lugs on the rims in the lower part of the compass bowl. The box communicates with the external atmosphere by a passage *f*. In a modification, Fig. 6, a similar elastic box, filled with the liquid and communicating with the bowl, is suspended by a hollow stem in a chamber P open to the atmosphere. In an arrangement to raise the card, Fig. 7, the bowl is



fitted with a side chamber R, in which two elastic boxes, united by a hollow neck *m*, are arranged. One of the boxes is attached to the wall of the bowl and the other to the opposite wall of the chamber R. The neck *m*, which projects through the wall of the chamber R at the point where one box joins the wall, and is connected to a thumb lever, is also connected to a bent arm W, which passes into the bowl and actuates a pivoted lever X. The lever X terminates in a flat ring which lifts the bell and the card. Fig. 8 shows a modification in which the two connected elastic boxes, communicating with the bowl, are enclosed in a chamber open to the atmosphere. The connecting-neck m^1, which actuates the lever X through a stem *x*, carries a rod *z*, which fits into grooves in a screw-threaded nut *y* and is moved thereby as the ring is rotated.

2018. Hoffman, J. W., and **Wilson, G. R.** Aug. 6. [*Provisional protection only.*]

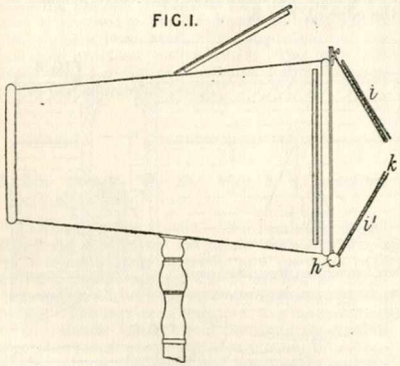
Reflectors.—Flexible mirrors are made from steel or other metal sheets, which are rolled to a fine thinness, highly tempered, and polished. The mirrors may be partly covered with india-rubber or other flexible material.

2068. Weatherdon, B. F., [*Leroy, C., Durand, J. J. M.,* and *Pichoin, C.*]. Aug. 11. [*Provisional protection only.*]

Thermometers and pyrometers.—A "thermometer" or "pyrometer," for use in a thermostatic arrangement, consists of a mercury bulb provided with two tubes, in which metal electrodes are arranged.

2210. Gould, W. Aug. 28.

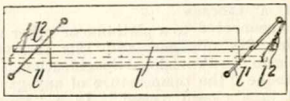
FIG.1.



Stereoscopes; graphoscopes; reflectors.—Coloured "slides" or "shades" of glass, gauze, or other fabrics are adjustably fixed at the back or front of a stereoscope or similar instrument, or over the top light or open portion, for the purpose of "reflecting various coloured lights and shades," upon the object viewed. "Photographic and "other similar pictures placed in conservatories, "windows," &c. may be similarly illuminated. Fig. 1 shows a stereoscope with glass shades *k*, held in spring pieces *i*, i^1, rotatable by means of knobs or buttons *h*.

2257. Frost, R. Sept. 3.

FIG.17



Rulers.—For teaching the making of straight strokes at a given angle in writing, the pen is pressed against a ruler *l* sliding on guides l^1 and returned by springs l^2.

2355. Bing, L. Sept. 13. [*Provisional protection only.*]

Actinometers.—To measure the actinic power of light numerically, a graduated transparent medium is used consisting either of overlying plates of talc, glass, or other suitable material, or of a wedge-shaped vessel filled with liquid, and behind this a sensitized plate is exposed. The wedge-shaped vessel tapers in the two directions of its length and breadth to one corner, and the lower transparent surface of the vessel is divided into a series of squares, commencing from this corner.

2360. Cairns, A. Sept. 14.

FIG.1.

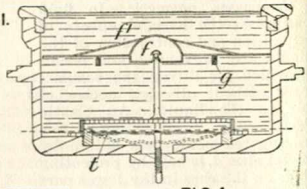
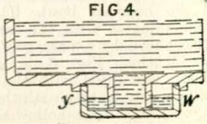


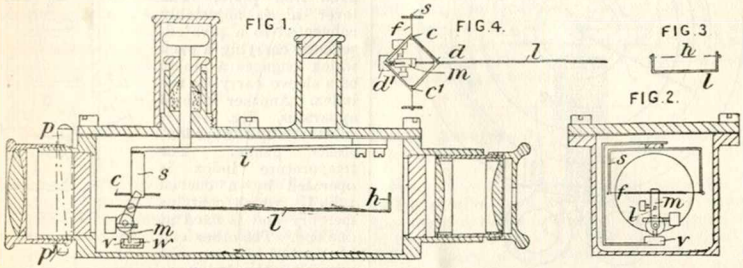
FIG.4.



Compasses, magnetic.—In those compasses in which the needles and the compass card are immersed in a bowl of liquid, the weight on the pivot is lessened,

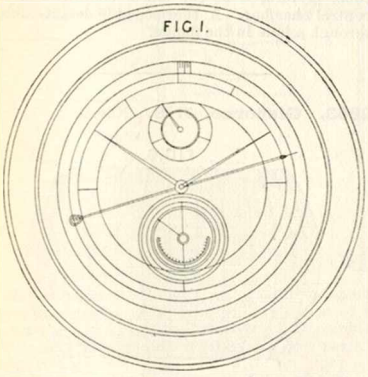
and with it the friction, by attaching to the card carrying the needles a hollow air dome or float, as shown in section in Fig. 1. The bowl may be kept full, irrespective of temperature, by the use of a flexible sheet of corrugated metal or other substance *t*, Fig. 1, and a screw and nut, one having a short tube *w* dipping into a vessel *y*, Fig. 2, containing air. The needles *g* may be kept out of contact with the liquid by being fastened inside the air vessel *f*, f^1.

2363. Varley, C. F. Sept. 14.



Latitude and longitude instruments.—Figs. 1, 2, 3, and 4 show a telescope combined with other parts corresponding with those of a reflecting sextant or quadrant, and used in like manner for obtaining latitude and longitude. The telescope is optically adjustable either by altering the positions of the lenses of the eye-piece or by the use of the thin prisms *p*, p^1. Between the object glass and the eye-piece of the telescope is a chamber with glass ends, filled with pure water. To the spring *i*, attached to the chamber and adjustable by means of a screw, is suspended a spring *s*, which carries and stretches a fibre *f* passing through holes *c*, *d*, d^1, c^1 in the square frame, Fig. 4. To this fibre is cemented a metal pendulum *m*, completely adjustable by means of two screws. A lever *l*, carrying a horizontal fibre *h*, is fastened by a screw to the metal piece *m*. An arm *w* on the piece *m* enters a cup *v*, so that any excessive motion, damaging to the lever and horizontal fibre, is avoided. The instrument forms an artificial horizon and is used to determine the sun's altitude.

2446. Weichert, W. Sept. 22.



Barometers ; thermometers. — In a combined chronometer, barometer, and thermometer, the face of the chronometer is furnished, as shown, with an outer circular indicator divided into six-hundred parts to indicate tenths of seconds. The barometer dial is inserted in the centre of its face, and the face of the barometer also contains a small thermometer divided into the three thermometrical scales.

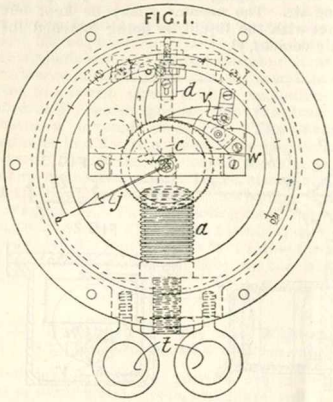
2531. Tolhausen, F., [*Dubois, E.*]. Oct. 2.

Sounding-apparatus. — The Figure shows a manometer which indicates the highest pressure to which it is subjected, and is thus adapted for sounding-purposes. A "deflecting rod" *c* is attached to the corrugated elastic tube *a*, on the inner surface of which the water presses, so that the rod actuates a bell-crank lever operating the pointer *j* by means of an adjustable piece *d*. A ratchet-wheel and pawl prevent the pointer from going back. The pawl may be released and the pointer set by means of the piece *v*, operated from outside so as to catch the lug *w*. The dial is protected by a strong sheet of glass, itself protected by a cage or frame. The apparatus is provided with rings *t*, to which the sinking-lines are fastened. Any convenient form of gauge may be used in place of the corrugated tube *a*.

(*For Figure see next page.*)

2531.

FIG. I.



2550. Wrench, J. H. Oct. 3. [*Provisional protection only.*]

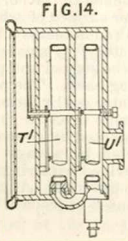
Magic-lanterns.—A magic-lantern is adapted to project representations of opaque objects. The object is placed in a "close box" opposite to focussing-glasses, so that rays of lime or other light may pass from a single or compound condenser on to the object, and thence through the focussing-glasses on to a screen.

2674. Newton, A. V., [*Winder, W. H.*]. Oct. 16.

Reflectors.—Mica is used instead of glass in making reflectors. Sheet mica coated with any metal is cut into pieces and secured by cement or otherwise to a mould or shell of the required shape. Or a metal reflector may be coated with mica secured to it by transparent cement.

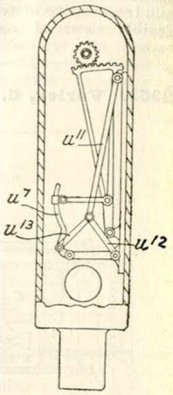
2687. Haseltine, G., [*Wiard, N.*]. Oct. 17.

FIG. 14.



Thermometers.— In an apparatus for indicating the extent to which steam is superheated, two indexes, one indicating the pressure and the other the temperature of the steam, are operated in combination, the divergence between the indexes being a measure of the superheat. The temperature index is operated by the differential expansion of an arrangement of brass and iron levers. Three brass rods u^{11}, u^{12}, u^{13}, Fig. 11, which are pivoted together, are also pivoted to a fixed iron plate and to a curved iron lever u^7, which is pivoted to the fixed iron plate. The lever u^7 is adjustably connected to a pivoted-segment carrying a rack which engages a pinion on a sleeve carrying the index. Another form of apparatus, Fig. 14, is substantially a "Bourdon" steam gauge. The temperature index is operated by a curved tube U^1, which contains mercury and is fixed at one end. The other end is attached to a segment operating the index as before. A compound bar of iron and steel may replace the tube.

FIG. II.

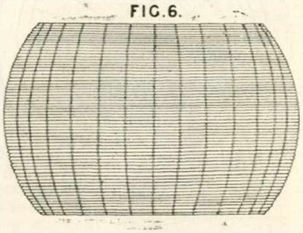


2725. Newton, A. V., [*Sewell, G.*, and *Bacon, F. W.*]. Oct. 22. [*Provisional protection only.*]

Salinometers.—The interior of a "salinometer "pot" is divided into two chambers by means of an open tube provided with a flange resting on the edge of the pot, the chambers communicating freely at the bottom. The supply or "induction "pipe" is closed at the top and perforated at the sides and rises nearly to the top of the outer chamber. The hydrometer is placed in an open tube, perforated at the sides, contained in the central chamber. A thermometer is introduced through a hole in the flange.

2863. Gisborne, J. S. Nov. 3.

FIG. 6.



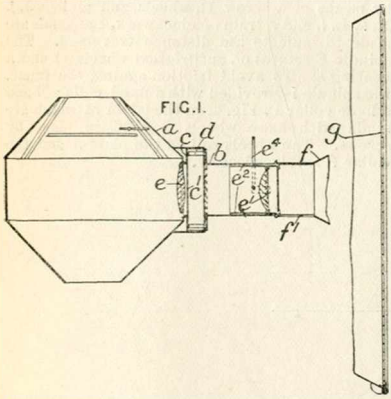
Compasses, magnetic.—Ships' and other compasses are stated to be protected from "local "attractions or influences" by setting around

them vessels of a spheroidal or similar form, preferably of iron, surrounded by coils of insulated wire through which a current is passed. The wire is coiled horizontally in opposite directions. Two such vessels may be used together. The vessels may be made in two parts screwed together horizontally, or of a number of staves after the fashion of a barrel, as shown in Fig. 6, wire being coiled round each stave. Another mode of protection consists in surrounding the compass with an iron vessel, spheroidal and open at the top and the bottom, or cylindrical and closed at the bottom, or of other shape, made to rotate about a vertical axis.

3101. Wood, C. Nov. 24. [*Provisional protection only.*]

Thermometers.—"Apparatus for measuring the "temperature of currents of air or fluid" consists of a metal tube, through which the current passes, fixed at one end to a base plate and provided at the other end with an arm which is connected by a link or otherwise to a lever giving motion to the pointer of an indicating-apparatus. This apparatus is carried from the base plate by a pedestal of non-expansive material, or of metal if it is set out of the current. In another form, the pedestal may be carried from an arm on the pipe.

3116. Fournet, A., and Nadaud, O. Nov. 27.

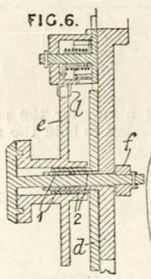


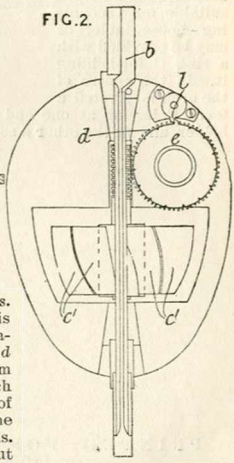
Magic lanterns.—Relates to a lantern which shows on a ground glass a magnified image of a picture or transparency such as a photographic positive. The lantern is composed of two parts; the first part is a globe *a*, with an opening through the top and bottom to allow of a light being put inside, the bottom of the globe being arranged to rest on the socket of the lamp or other kind of lighting-apparatus employed. Through the side of the globe a round hole is formed, in front of which is a slide composed of plates *c*, c^1, held together by springs *d*, the transparency being placed between the plates and the latter having an aperture for light to pass. Adapted to the slide is a tube *b* inside of which are two lenses, one *e* before the picture, and the other e^1 behind it. The latter is mounted in an inner tube e^2 which can be slid inside the tube *b* by a handle e^4. The second part *f* is connected with the globe by a tube f^1 into which the tube projecting from the globe is inserted. The face or front of the lantern is closed by a ground glass *g* on to which is thrown a magnified image of the picture in the slide.

3241. Davies, J. Dec. 8. [*Provisional protection only.*]

Parallel rulers.—Relates to an apparatus for ruling parallel lines at given distances without the use of dividers or scales. About the middle of the ruler is fitted a rolling drum divided at different parts of its periphery into different proportions by small holes. A small plate, sliding on a rod parallel with the drum, carries a pin which, as the drum revolves, takes successively into the holes in the plane for which the plate is set. The plate is pressed by the finger to cause the pin to enter the holes and is raised from the drum by a spring.

3346. Walker, T., and Walker, T. F. Dec. 20.





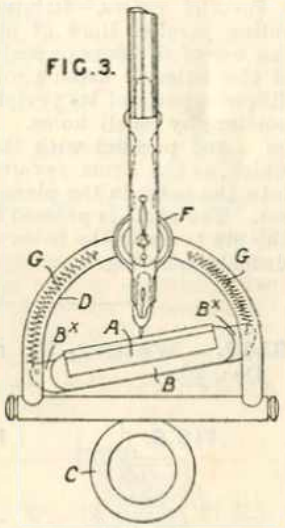
Sounding-apparatus.—The indication is effected by the rotation of a wheel *d* gearing with a worm on a spindle *b* which is rotated by means of vanes c^1 on it as the apparatus descends. The wheel turns about a hollow axle 1, Fig. 6, forming part of the frame, and is itself provided with a split spring stem 2, by means of which it grips the stem of an

indicating-wheel *e*, graduated and provided with notches so that it may be read by the touch. To this wheel is attached the stem of a pinion *f* gearing with another indicating-wheel on the other side of the frame, as shown. The two indicating-wheels may thus be simultaneously set before taking a sounding. The wheel *d* is prevented from turning back by means of a stop *l* on a cylinder provided with a spiral spring, which engages a projection on the indicating-wheel *e* serving as a zero or point of reference. The apparatus is dragged down by means of a weight suspended below it at a distance sufficient to prevent any interference with the indications, due to the disturbing action of the "wake." Reference is made to Specification No. 3130, A.D. 1861.

3367. Weber, M. Dec. 21.

Ruling &c. pens.—Relates to an apparatus for grinding or setting steel pens, which is also applicable to drawing-pens. A strip A of Arkansas or other cutting-stone having a fine grain is mounted in a swivel frame B having spherical ends which are connected by pins to guide-plates B^x. These plates slide in guides formed in an arched frame D which may be secured to a base forming a weight suitable for a counting-house table, or may be provided with a ring C for holding it. In the centre of the arch is pivoted a lever F, having at one end a rest for the pen-holder, and at the other a socket to hold the nib in place. The frame carrying the stone is pressed upwards by springs G inserted in the frame D either above or below the frame B. For setting drawing-pens, the socket for receiving the nib must be slightly modified and may be slit to enable it to open and receive nibs of various sizes.

FIG. 3.



3430. Ely, A. B., [*Hotchkiss, T.*]. Dec. 29.

FIG. 1.

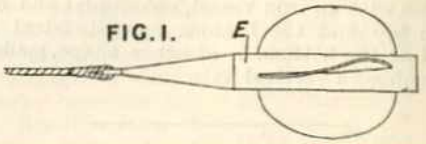


FIG. 3.

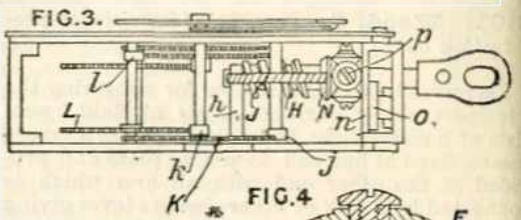
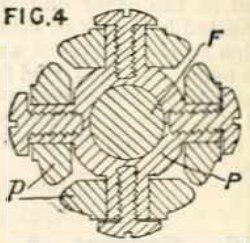


FIG. 4



Logs. — A log E, feathered so as to rotate regularly on being drawn through the water, is attached by a cord to the spindle F of the indicating-apparatus shown in Fig. 3, and by means of a screw H, wheels and pinions J, *j*, K, *k*, L, *l*, and a train of clockwork, the hands are made to indicate the distance traversed. The spindle F rotates on antifriction wheels O and a bearing *h*. To avoid friction against the frame, the spindle is provided with a fixed collar N and a loose collar P, Fig. 4, on the latter of which are studs with loose wheels *p* held in place by screws. The wheels roll on the plate *n* and the collar P revolves loosely.

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