PATENTS FOR INVENTIONS.

ABRIDGMENTS OF SPECIFICATIONS.

CLASS 97,

PHILOSOPHICAL INSTRUMENTS,

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

PERIOD—A.D. 1867–76.

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1904.

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EXPLANATORY NOTE.

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

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

SUBJECT-MATTER INDEX.

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

Tripod and like stands—*cont.*
Excepting—*cont.*
(*irons, hand, stands for*), [*Abridgment Class* Washing &c.]; Lamps and burners for lighting &c., (*pedestals and stands*), [*Abridgment Class* Lamps &c.]; Reading-desks and music stands, [*Abridgment Class* Furniture &c.]; Sewing-machines, (*stands for*), [*Abridgment Class* Sewing &c.]; Stands, Card &c., [*Abridgment Class* Furniture &c.]; Velocipedes &c., (*stands*), [*Abridgment Class* Velocipedes];
for which see those headings.
camera stands, attachments for. *See Abridgment Class* Photography.
hinges for. *See Abridgment Class* Hinges &c.

T-squares. *See* Squares, Drawing &c.

Urinometers. *See* Specific-gravity estimating apparatus.

Vanes, Wind. *See* Wind vanes.

Weather glasses. *See* Barometers.

Weather indicators. '67. 3335. '68. 3489. 3576. '71. 948.
Excepting Barometers;
for which see that heading.

Wind gauges or anemometers. *See* Anemometers.

Wind vanes. '67. 3335. '68. 3489. '70. 293. '74. 4141. '76. 3187.
anemometers or wind gauges. *See* Anemometers.

NAME INDEX.

The names in *italics* are those of persons by whom inventions have been communicated to the applicants for Letters Patent.

PHILOSOPHICAL INSTRUMENTS,

[*including* OPTICAL, NAUTICAL, SURVEYING, MATHEMATICAL,

and METEOROLOGICAL INSTRUMENTS].

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

A.D. 1867.

43. Dœring, F. B. Jan. 7. *Drawings to Specification.*

Tripod stands.—Relates to rock drills and like machines. Two of the legs of the stand are telescopic, and the third is composed of the two side supporting-shafts of the boring-engine along which it moves as the work proceeds.

174. Ross, T. Jan. 23.

Lenses.—Consists in the employment of different descriptions or qualities of flint glass or of crown glass for both the convex and concave glasses of lenses for 'photographic cameras and various optical instruments,' the convex being made of light flint or light crown glass, and the concave being made of heavy or dense flint, or heavy or dense crown glass.

201. Hartin, W. Jan. 25. [*Provisional protection only.*]

Ruling-pens.—A pen for ruling and other purposes is made with two or more nibs connected to the same barrel, which make two distinct lines. The barrel may otherwise be made in the form of a double or treble penholder to receive separate nibs.

380. Grant, A. G. Feb. 9. [*Provisional protection only.*]

Magic-lantern apparatus.—Relates to apparatus for exhibiting moving and other pictures. The pictures for reproduction on the screen are arranged in a band strip moving on a pair of flanged winding reels or rollers, journalled in bearings formed in a metal frame. Intermediate guide-rollers are provided and so arranged that the pictures passing over them are caused to present a flat surface to the action of the light. The winding-reels are rotated by means of an adjustably-supported shaft operated by a crank or otherwise, and carrying a worm which may be brought into gear with a worm-wheel on either reel as required. The pictures are illuminated by condensing-lenses set at an angle to avoid casting shadows from any inequalities on the surface of the picture.

433. White, G., [*Delsarte, F.*]. Feb. 16. [*Provisional protection only.*]

Levels; theodolites; sextants; clinometers.—Relates to pendulum levelling-instruments, sextants, theodolites, and other instruments for measuring angles of elevation. Instead of one graduated circle, two or more are provided—one with the primary divisions, another with divisions of these primary divisions, and others with further subdivisions. Each circle is read by a separate pointer, and the axes of the pointers are suitably geared together, and with the pendulum, or vertical limb, as the case may be.

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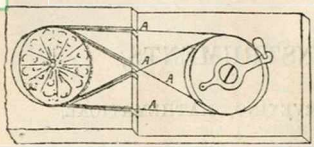
522. Hill, W. R. Feb. 26. [*Provisional protection refused.*]



Chromatropes; magic-lanterns, slides for. Two circular pieces of glass B, upon which photographs may be taken and colour introduced by means of gelatine, oil, varnish, water colours, and stained glass, are revolved in opposite directions by means of a band A, or a rack apparatus. The apparatus may be used as a dissolving-view slide, or in the hand.

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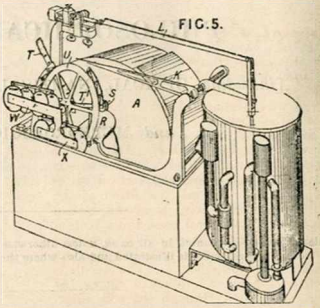
631. Siemens, C. W., [*Siemens, W.*, partly]. March 7.

Alcoholmeters.—Relates to apparatus for use in connection with a liquid meter for spirituous liquids for measuring the quantity of absolute alcohol contained in the liquid. A hollow vessel made of thin brass and filled with absolute alcohol is suspended from a spring arm L in a mixing-vessel. It is also connected as shown to an index finger K. A cam R, fixed on the spindle of the measuring-drum A of the meter, has three hollows in its periphery which cause a "truck" S on one arm of a bell-crank lever T, T¹, pivoted loosely on the spindle of a ratchet-wheel U, to rise

FIG.5.



and fall. The ratchet-wheel, by which a second counter W is operated, is actuated by means of two spring pawls on the lever. The free end of the index finger K catches the free arm of the bell-crank lever, which is of a peculiar curved form as shown, and graduated, and only permits it to move the ratchet-wheel to an extent proportionate to the quantity of alcohol contained in the liquid.

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663. Henry, M., [*Anfonso, L. A.*]. March 8.

Logs and current meters.—The revolutions of a screw or helix attached to, or towed by, a ship, or immersed in a running stream, are caused to make and break an electric contact, thus controlling an electrically-actuated counter with index fingers showing the distance travelled by the ship or current. Fig. 1 shows the counter and Fig. 2 the screw and contact apparatus, the latter being connected by a flexible rope containing an electric conductor *o* with the former. The boss A of the screw is formed with a cam-groove in its end engaging the end of a lever *c*, *d* which carries a spring *r* arranged to make and break contact with the end of the conductor *o*. The counter consists of a train of clockwork controlled by an escapement N, the

FIG.1.

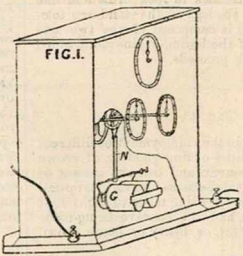
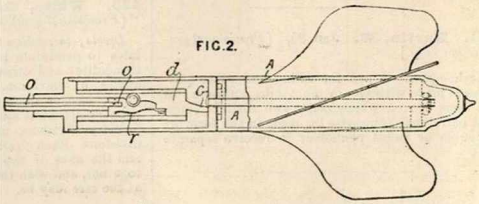


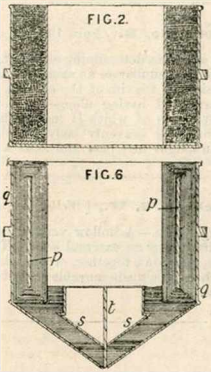
FIG.2.



escape-wheel being allowed to advance a step each time the escapement rod is attracted by the electromagnet G in the circuit of the conductor *o*.

676. Gisborne, J. S. March 9.

Compasses, magnetic.—To prevent deviations of the needle caused by local attraction, there is wound round a core surrounding the needle flat insulated iron wire, through which a current of electricity may be passed or not. The coils of wire may be fixed to the compass box, or they may be placed outside the gimbals. The method of winding may be varied. In Fig. 2, the wire is shown wound horizontally round a vertical cylindrical frame. A flat coil may be fitted at the bottom. In Fig. 6, the wire is shown wound vertically round the cylindrical core, and a bottom coil of wire, which may, however, be dispensed with, is wound round a frame *s*, the whole being placed inside the compass box *q*. The needle is suspended from the pin *t*. When a current of electricity is not passed through the coil, intermittent or continuous motion is given to it, to prevent it from acquiring polarity, as described in Specification No. 2863, A.D. 1866. Reference is also made to the use of coils of wire of the forms described in Specification No. 401, A.D. 1863.

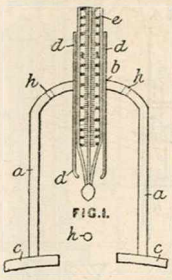


705. Hatton, T. March 12. [*Provisional protection only.*]

Magic-lanterns, slides for. Impressions are obtained on thin plates of gelatine by wood blocks, lithographs, &c., the gelatine being then placed between plates of glass for protection.

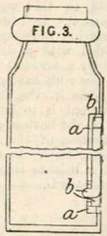
810. Bischof, G. March 20.

Pyrometers.—As used for indicating the temperature of fused metals &c., the apparatus consists of a cylindrical fireclay crucible *a* luted to an arched fireclay plate *c* which floats on top of the fused metal. Holes *h* are formed in the crucible to cause a slight circulation of air. A glass tube *d* is passed through a hole *b*, and a thermometer *e* passed through it, so that it is held at a fixed distance from the surface of the metal. The temperature indicated on the thermometer will be proportional to the temperature of the metal. When used for ascertaining the temperature of furnaces, gases, retorts, and the like, one side of an iron plate is exposed to the direct heat, and on the other side are fixed two concentric rings between which the crucible is inserted, the space between the crucible and rings being filled with fine sand.



1010. Webber, W. C. April 4.

Thermometers. — Consists in applying thermometers to feeding-bottles, chemical bottles, jars, and the like. The bottle or other vessel, with straight or curved sides, has a recess *a* and an opening to receive a thermometer *b* and its bulbs. The thermometer may be provided with a scale, or the graduations may be made on the bottle. Sometimes the bottle is enlarged for some distance above the base, and the thermometer is passed through an aperture in the upper part of the enlargement and secured therein



by cork, india-rubber, or cement. The upper part of the thermometer is then secured to the bottle by a band. The thermometer may be attached in various other ways.

1098. Shortrede, R. April 13.

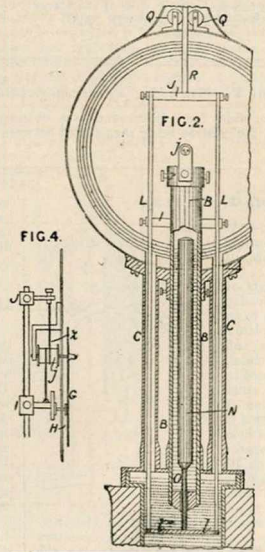
Compasses, magnetic, determining errors of. The instrument is made similar to an azimuth compass. On opposite sides of the rim of the cover is placed a semicircular band having along its middle a narrow slit by means of which it may be directed to the sun or other heavenly body, or through which the sun's light may pass and show a streak of light on the card. The bearing of the object according to the compass card is then compared with the true astronomical bearing. The surface projecting from the rim of the bowl or the rim of the cover is graduated. When the light is faint, the object may be viewed direct or by reflection from the glass cover. The arc may be replaced by short pieces of unequal lengths having slits, the longer piece towards the object having a hinged reflector, or a portion of a horizontal cylinder acting as a reflector. By another method, the rim of the bowl or cover is graduated; by turning the cover so as to bring the bar of the roof into the shadow of the opposite bar, the zero mark will indicate the angle between the object and the ship's head.

1218. Cochran, J. W., [*Wells, C.*, partly]. April 27. [*Provisional protection only.*]

Levels; clinometers.—A hollow vertical disc of glass is half filled with alcohol, the surface line of which is indicated by an external scale. The disc may be of blown glass, or of two glass plates, one with a ridge, cemented together, or one plate may be of metal. A graduated casing is provided, the foot of which may be made movable so that it can be set at any desired angle by means of a quadrant and set-screw.

1262. Clum, H. A. May 1.

Barometers.—Relates to the indicating-devices of mercurial barometers where a dial is used, being an improvement on the invention described in Specification No. 1891, A.D. 1865. A buoy float N, Fig. 2, in the mercury tube B is connected at the bottom by a rod *o*, crosshead *l*, and rods L to crossheads I and J. The lower crosshead I carries an index H, Fig. 4, which indicates the whole numbers on a vertical scale on the dial. A cord *z* is attached to both crossheads I and J, and passes round a drum *j* which carries an index hand G for indicating fractions on the dial. Index hands for two dials may be worked in this way by the same instrument. In instruments suitable for marine purposes, the cistern is provided with a diaphragm held in place by a screwed cover. Through this pass rods having plugs which fit into seats in the tubes C when the instrument is to be transported. A plug on the bottom crosshead fits into the bottom of the mercury tube at the same time. In another improvement, a balance ring or float is fixed on the rods L.



1526. Newton, W. E., [*Cook, H.*]. May 22. [*Provisional protection only.*]

Stands.—A stand for a small portable camera consists of a socket and upright post provided with a universal joint which permits of the rapid fixing and removal of the camera.

1541. Blackham, H. May 24. [*Provisional protection only.*]

Spectacles.—Relates to "D-eye or other side folding spectacle frames where a top eye is used "in addition to the ordinary bottom eye." The top eye is attached to the bottom eye by a double joint, and a spring is secured to the top eye.

1570. Loam, M., and **Fearns, F. H.** May 28. [*Provisional protection refused.*]

Optical instruments, exhibiting. Relates to apparatus whereby microscopes and other optical instruments may be exhibited to a number of persons so as to allow the latter to retain their positions round a table or other suitable support for the instruments. On the support is mounted a travelling table, preferably of triangular form, one or other of several holes at one angle fitting over a pin on the support. The instrument, and a source of illumination or a reflector, being placed on the travelling table, can be passed from one person to another without disturbing their relative positions.

1620. Caithness, James, **Earl of.** May 31.

Compasses, magnetic.—Relates to a pendulum suspension device. On a rod B inside the binnacle is attached an adjustable weight G, and at the top a ball C which works in a socket D. The compass box E is attached to this ball C by a screw, and to prevent rotation a pin *c* is inserted through the socket D into a groove in the ball C.

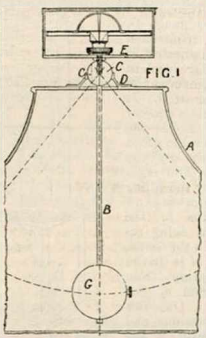
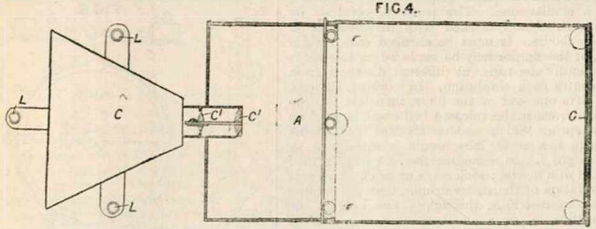


FIG. 1

1676. Petrzywalski, J. June 7.

FIG. 4.

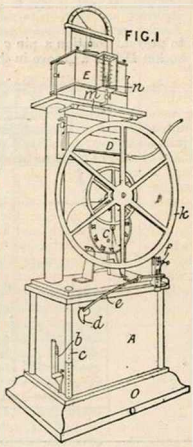


Camera obscuras; magic-lanterns; graphoscopes.—Relates to apparatus, described as a 'camera 'obscura,' for exhibiting on an enlarged scale carte-de-visite portraits, prints, lithographs, or drawings, insects, and other objects; or for producing photographic negatives and positives from the

same. The object is placed at the back of a pyramidal box C, and is illuminated by three lamps L, L, L, one of which is behind it. A magnified image is thrown by the lenses C^1, C^1 on a ground glass plate G at the end of a square box A formed of two parts one sliding within the other. The rays of the three lamps are concentrated on the object by reflectors. The apparatus may be used for enlarging, and other photographic operations, by substituting a frame containing prepared paper or glass for the ground glass.

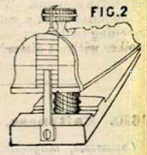
1684. Warburton, J., [*Friedleben, C.*]. June 7.

Photometers.—Relates to apparatus for recording the quality of coal gas. The gas enters the apparatus through a sensitive gauge D, Fig. 1, controlled by the indicator E, the water level in which governs the pressure in D. It then enters a meter in the case A, the water level in which is shown by the gauge *c*, and regulated by the filling and drawing-off apparatus *b*, the overflow being received in the foot *o*. A cam *d* is driven by gearing from the drum of the meter. On this cam rests one end of a lever *e*, the short arm of which comes above the horizontal arm of a bell crank, the other arm of which carries a weight *f* and a stem carrying a needle made to puncture a disc of paper gripped between a disc *k* and a similar disc. The paper is revolved by clockwork C and marked with divisions representing hours. It must be changed each revolution, or the needle may be made adjustable so as to puncture the paper at different distances from the centre each revolution. In working, the cam first lifts one end of the lever, then lets it drop suddenly, when the released bell crank is acted on by a spring which shoots forward the needle through the paper; the needle is withdrawn by the weight *f*. In a modification, a pencil is used instead of a needle; each mark or prick represents a revolution of the meter drum. The gas escapes from the meter A, through a fine hole in the glass tube *m*, or a small opening in a disc of platinum, passing to the burner *n*. A thermograph is applied to the inlet pipe to register the temperature; and, to prevent the gas from being affected by air currents after passing through the small opening, it is led under water contained in a partially-filled closed vessel, whence it passes to the burner. The flame from the burner *n* burns between two scales, and when the lighting power of the flame for a certain pressure and speed of flow of the gas is once ascertained it is only necessary to read off the speed from the register and compare this with the height and breadth of the flame to find the value of the gas at any other time.

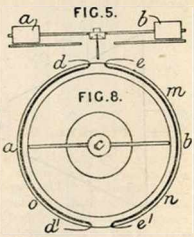


2005. Gedge, W. E., [*Durand, A.*]. July 9. [*Provisional protection only.*]

Levels; clinometers.—A spirit level is hinged at one end to a base-plate, so that it may be adjusted by a screw as shown. A pointer on the base-plate moves over a scale on the end of the level, thus indicating the inclination of the plate in degrees. For smaller divisions the screw head is divided and provided with an index.



2059. Laurent, P. M. A. July 13.



Compasses, magnetic.—Relates to rendering the cards or needles steady in a heavy sea, and also to rendering them more sensitive. To render the

card steady, it is weighted at the circumference and made as light as possible at the centre, by thickening the needle at its ends and diminishing the size of the cap, or by attaching detachable rings, of some non-magnetic substance, by pins &c., or by attaching adjustable weights or bars either over or under the card. In Fig. 5, the weights *a* and *b* are shown adjustable on the rod supporting them and are placed over the card. In a modification, Fig. 8, the two needles d, d^1 and e, e^1 are bent and carried on a ring *b*, *o*, *m*, *n*, being connected by a rod *a*, *b*. To render the needle more sensitive, the card &c. is weighted at the centre.

2070. Tongue, J. G., [*Piatti, T.*]. July 13. [*Provisional protection only.*]

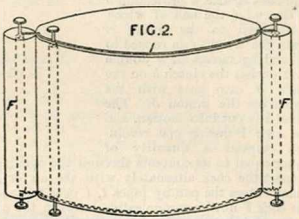
Rulers; angles and curves, plotting.—Relates to instruments or apparatus for ruling parallel, angular, and curved lines. Two rules are connected at or near their extremities by jointed arms which are connected together at the joints by a rod or link. Upon, or near, the middle of one rule a suitably-divided transverse bar is mounted which moves on a guide-piece fixed on the other rule; this bar determines the distance that one of the rules moves in regard to the other. The equal parallel distances required are obtained by means of a small movable sliding piece, which can be fixed, when desired, upon the divided bar by a thumb-screw, and is brought against the link when one of the rules is moved away from the other. Other forms of stops may be used, and the extremities of the two rules render more perfect. For ruling angular and curved lines, there is combined with the above instrument a movable ruler arm working upon a joint, the centre of which is placed exactly upon the exterior edge of the movable rule, and by preference at the extremity. This arm forms an angle of 90° when at the extremity of its movement, and therefore can form any angle within 90°; it is fixed when required by means of a small quadrant and secured by a thumb-screw to the rule. The arm has a movable compass branch serving to trace quarters of circles corresponding to the degrees; the opposite extremity to the centre of rotation moves upon a divided quadrant indicating all the degrees. When the arm is in any desired position, it is fixed to the quadrant by a thumb-screw. A sliding or tail piece may be placed on the arm, for the purpose of lengthening it when desired.

2074. Boehm, G. July 15. [*Provisional protection only.*]

Compasses, magnetic. — Relates to a combined bottle and compass. The bottle is made flat-sided like a watch, and has a recess on one side; in the deeper centre part of this recess is fixed a piece of paper for fixing the pivot of the needle, so that the glass need not be drilled. A card and glass cover are provided.

2170. Silvy, C. July 26.

Camera obscuras.—Rollers F from which sensitized paper can be unwound are arranged in connection with a camera obscura so that, by winding the paper round the frame I of the latter, panoramic photographs can be obtained.



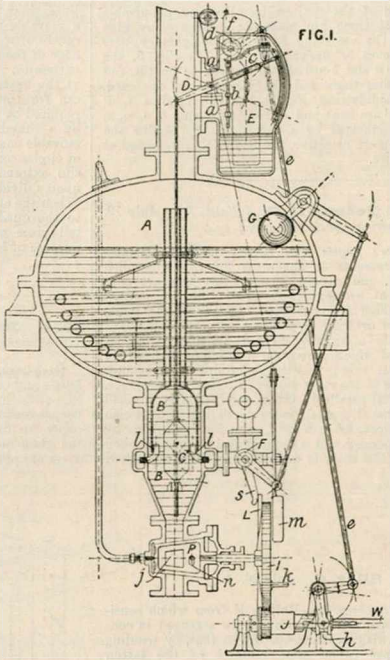
2183. Franklin, G. July 27. [*Provisional protection only.*]

Compasses, magnetic.—The points are marked on the underside of the card, and are viewed by an adjustable inclined mirror, placed in front, so that the vertical image is easily compared with the ship's direction. The card is lighted by side lights, and at night by lamps set in front. For the standard compass, the card has its points on the underside and is viewed from beneath. The compass box is furnished with guides sliding on guide-rods on a mast &c.; by a halyard the compass can be raised, and lowered to deck, on its guide-rods.

2213. Gordon, G. July 31.

Specific - gravity estimating-apparatus.—Consists in the adaption to vacuum pans used in the manufacture of sugar of a mechanical saccharometer in which a weight C, suspended from one end of a scale beam D, is adjustably counterbalanced by a weight E, or by a spring, so as to sink in water or weak liquor but rise as the liquor becomes dense. One end of the beam D indicates on a scale the rise and fall of the weight C. To protect the suspending rod or wire from the vibration caused by boiling, it is surrounded by a tube (or two tubes with a space between them) of wire cloth or perforated metal. The weight C may be hung in these tubes instead of in the pocket B, or it may be suspended from pulleys and cranks, being counterbalanced by springs or weights, or it may be hung directly from a spring, or it may be of light specific gravity and not be counterbalanced. In either case there may be fingers fixed to it to indicate the density on a scale. When the liquor has reached the required density, the weight C rises and the beam D presses against a projection *b* on the rod *a*, the end of which is attached to the spring *c*. Thus, the weight *f* is caused to fall and by means of a double lever pushes the clutch *h* on the shaft W into gear with the clutch on the pinion J. The wheel I is put into motion, and the cock P during one revolution empties a quantity of liquor equal to its contents through the opening *j*. The opening *n* serves by means of two pipes to connect the cock alternately with the air or a vacuum. The ball G and cock F supply fresh liquor, which enters the pan by pipes *l*, *l* near the weight C. A ring L on the wheel I returns the lever *s* on the cock F until communication between the cock P and the pan is cut off. When the opening *j* has discharged the contents of the cock P, a projection *k* on the wheel I encounters the weight *m* attached to a lever which raises the weight *f* by means of a rope or chain. The entrance of fresh liquor having brought the weight C to its normal position and liberated the spring *c*, the latter locks the pinion *d*, thus raising the rod *e*, and, putting the clutches out of gear, returns the apparatus to its original position.

FIG. 1.

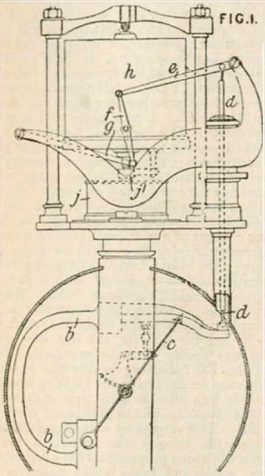


2249. Budenberg, A., [*Schäffer, B. A.*, and *Budenberg, C. F.*]. Aug. 3.

Barometers.—Fig. 1 shows a steam-engine indicator, but the invention is stated to be applicable to barometers. A Bourdon tube *b* is closed at both ends and fixed at its lower end. Variations of atmospheric pressure will then alter its curvature, and cause movement of the free end b^1, which, through a parallel motion *e*, *f*, *g*, moves a pencil or marker which records the variations on paper on a drum *h* driven by clockwork. The clockwork may be put in the drum, or the drum driven by other means. A band of paper may be drawn from one drum to another between the marker and a supporting-surface, and the marker may be carried by an arm attached to the rod *d*. The tube *b* may also operate an index hand *c*. The paper is ruled with

vertical time-lines and with horizontal lines showing barometric pressures.

FIG.1.



2561. Brooman, C. E., [*Deverte, C. A.*]. Sept. 10. [*Provisional protection only.*]

Thermometers.—A spiral bimetallic spring is mounted on one of two pillars on a metal plate; the other pillar supports a pointer. On the pointer is a bobbin or pinion having a spiral spring for bringing the pointer back to zero, and a chain wound round it connected to the end of a lever fixed to the end of the bimetallic spring. A toothed segment may be applied at the end of the lever. The bimetallic spring is attached by a screw to a piece free to move on the supporting-pillar, so that the instrument can be adjusted. The spring is formed from a copper tube, round which is wound a band of spring steel, the two being then soldered together and the spring cut out in a screw-cutting lathe by cutting away the parts between the steel band.

2563. Sutton, C. Sept. 10. [*Provisional protection only.*]

Demonstrating persistence of vision.—A model or form, consisting of a bent and coloured strip of metal or other material, is rapidly rotated, producing the illusion of a symmetrical solid of circular section. Such a model is formed with a socket and placed on a spindle which is rapidly rotated by means of a crank handle and toothed gearing. The whole apparatus is mounted on a metal frame.

2592. Paget, F. A. Sept. 13. [*Provisional protection only.*]

Compasses, magnetic, preventing deviation of. To prevent the deviation of the compasses of iron or steel ships, the vessels as a whole, or any parts thereof, are demagnetized, or have their magnetic state altered, so that they will not affect the compass needle, by passing electric currents round spirals of wire arranged round the hull or other parts of the ship. The current may be either continuous or intermittent, and it may be an induced current. The separate plates of the ship may also be rubbed with a magnet to produce the same effect. Reference is made to Specifications Nos. 227 and 3209, A.D. 1866.

2634. Huggins, J. Sept. 19. [*Provisional protection only.*]

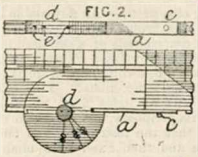
Polariscopes.—Relates to a polarizing kaleidoscope. The eye-piece is fitted with a Nicols' prism or other form of analyser, and the slide is made removable and carried in a frame at the end of the tube; it contains polarizing objects, *e.g.*, talc &c., and may be made to revolve by a rack and pinion. The apparatus is adjustably fixed on a stand, on which the polarizer is also carried.

2737. Laine, L. Sept. 28. [*Provisional protection only.*]

Opera and field glasses; eyeglasses; reading-glasses.—A "hand glass, binocle, or spy-glass" is mounted by means of a spring in the stick of a fan, and is projected for use by pressing upon a button connected with the spring.

2807. Bradburn, A., and **Marsh, S. T.** Oct. 5.

FIG.2.



Protractors; squares; rulers.—To enable jointed rules to be set at an angle, or to form a straight

edge, a sliding piece *a* is let into one arm at each joint, being held in place by a pin passing through the rule and through a slot in the piece. By a thumb-piece *c* the slide is slid into any required recess *e* in the jointed portion *d*. In a modification, the slide is slotted and moves over pins projecting from the edge of the rule.

3017. Lake, W. R., [*Cochran, J. W.*, and *Wells, C.*]. Oct. 26. [*Provisional protection only.*]

Clinometers; levels.—An instrument for measuring the inclination of any surface upon which it is placed consists of a hollow glass disc having a graduated circle at its rim and half filled with liquid, so that, when the disc with its plane vertical is mounted on a base and placed on any inclined surface, the line of the liquid surface will pass through the centre of the disc and will indicate on the graduated circle the angle of inclination. The disc may be made in two parts, cemented together, or it may consist of a glass disc cemented to a metal disc. The base may be adjustably secured to a graduated circle which forms a frame for the disc.

3116. Adeane, H. Nov. 5. [*Provisional protection only.*]

Eye-protectors.—To protect the eyes from wind, dust, snow, &c., a metallic frame, wholly or partly covered with gauze, net, or transparent material, is employed. The upper part of the frame is fitted to the forehead, the middle portion projecting over the eyes and the lower part resting on the nose or face. A piece jointed at each end of the forehead clip serves for fixing the frame to the head and for adjusting it to different faces. At each side is a movable stay for keeping the frame extended. The different parts are pivoted together, so that the whole may fold up.

3154. McKimm, I. Nov. 8. [*Provisional protection only.*]

Levels; clinometers.—An adjustable level, applicable for measuring the inclination of parts of machines &c., consists of a standard mounted on a base-plate and carrying a rotating stud, on one end of which is a box containing a spirit level and on the other an index plate. This index plate is provided with an index fixed to the bed and has teeth on its periphery, against which rests a spring catch so that the instrument can be adjusted at any angle and then fixed by a binding-screw on the stud. The accuracy of the instrument may be determined by having a stop and adjusting-screw under the box containing the spirit level.

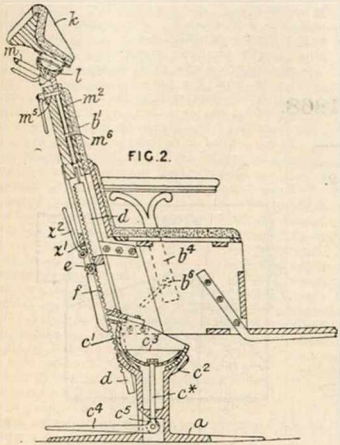
3335. Stanley, W. F. Nov. 25. [*Provisional protection only.*]

Weather indicators; barometers; anemometers; wind vanes.—Relates to a combination of instruments arranged on one frame, which will indicate the barometeric pressure, the direction and force of the wind, the temperature, and the hydrometric and electrical state of the atmosphere; also whether the barometer is rising or falling, and the combined action of the atmospheric pressure and the direction of the wind. A rain gauge and a clock are also provided. If a mercurial barometer is used, the tube is curved to make room for other parts of the instrument. The column of mercury is adjusted to standard by a floating gauge which is divided as a vernier to read on a scale; an adjusting-screw is thus dispensed with. The instrument for indicating whether the barometer is rising or falling consists of a barometer tube of an inverted construction, having the bulb in the upper part of the tube; the return limb of the bent part of the tube carries a float connected with a line passing over a pulley which carries an index. When this index reaches either of the indications 'rising' or 'falling' on the dial it is stopped, so that, should there be any further rise, the line slips over the pulley, and should there be any further fall the line falls. For indicating the direction of the wind, a wind vane on the top of the building is connected by one or two wires or cords passing over pulleys and by a Hook's joint to the index moving over the dial. This apparatus may be combined with a barometer, to give the combined indication of both, for which purpose there is a separate barometer wheel and index which points to 'fair,' 'rain,' &c. on a dial, made to rotate by means of a cam or crank from the wind vane. The velocity of the wind is indicated by means of a U tube, containing liquid, one end of which is connected by a tube with the vane on the top of the building. The pressure in this tube is reduced, or increased, by a rotating fan or screw, thus affecting the level of the liquid in the U tube.

3404. Steane, S. E. T. Nov. 30. [*Provisional protection only.*]

Lenses.—Relates to the construction of lamp globes or other glasses for refracting and transmitting artificial or solar light. The glasses are double, plain, coloured, or ornamented, convex outside and inside, and with the space between filled (or not) with water or other transparent liquid, or with glass or other suitable substance cut or moulded, in addition to or instead of the liquid. Means are provided for preventing the liquid from freezing when necessary, as in street and signal lamps. The double sides of the glasses may be plano-convex in transverse section, with circular, oval, square, or other space for the light; or the glasses may consist of a cylinder and convex surfaces inside; they may also be flat on both sides.

3484. Morrison, J. B. Dec. 7.



Tripod and like stands.—Relates to the construction of a dentists' or other operating-chair the stand of which is provided with a form of universal joint which is applicable also to camera, telescope, and like stands. Three screws O, Fig. 8, extend downwards in a vertical position or vertically, and work in nuts p attached to supports q, which are jointed or hinged to the foot a. The upper parts of the supports consist of frames provided with bearings for the screws and jointed to lugs on a hollow hemisphere c^1, on which the chair or apparatus rests. The screws may be operated simultaneously by pinions and bevel gearing. A piece c^2 rests on c^1, and a piece c^3 inside c^1 is connected to c^2 by a tightening-screw c^7, which is preferably operated by bevel gearing V, W. The dentists' chair shown in Fig. 2 is supported by slides d attached to a piece c^1 in a cup c^2 fixed to a heavy foot d. The bolt $c^\times$ passing through the piece c^3 is jointed to a lever c^4 formed with a cam c^5, so that, when the lever is raised, the bolt is slackened, and the chair &c. can be adjusted.

3607. Hubbard, W. A. Dec. 19. *Woodcuts.* [*Provisional protection only.*]

Proportional compasses; dividers.—Proportional compasses and dividers are constructed like a pair of lazy-tongs, consisting of bars pivoted in pairs at the middle, and with the ends of each pair pivoted to the ends of the next pair. The pivots in one or more rows have points, pencils, pens, dotting-wheels, &c. for setting off proportional distances, dividing lines, &c.

3662. Newton, W. E., [*Rakowitsch, B.*]. Dec. 24.

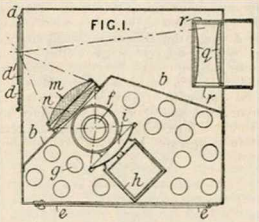
Alcoholmeters.—Consists of an alcoholmeter the principle of which is based on the fact that chloroform mixes with alcohol but not with water. Chloroform is filled into a tube up to the mark a^1; the liquid to be tested is then poured in up to the mark u, and the two are shaken together. The chloroform absorbs an amount of alcohol proportional to the amount in the liquid. If the line of separation between the aqueous liquid and chloroform falls below the bottom of the scale on the tube, spirits of wine at 95 degrees is added up to the line a, and the mixture is again shaken; the line of separation then indicates the strength on the right-hand scale. If the line is above the bottom of the scale, a mixture of equal parts of spirits of wine at 95 degrees and water is added up to the line a (or spirits to the line o and water to a), and the line of separation then indicates the strength on the left-hand scale. The operation is affected by the temperature, the height of the line rising one degree on the scale for each five degrees of temperature.

A.D. 1868.

19. Krüss, E. J., and **Krüss, W. A.** Jan. 2.

Magic-lanterns.—Relates to a "camera or lantern" for showing opaque objects. Fig. 1 shows a plan. The case is divided by a vertical partition *b* into two compartments, and is provided with two doors, one *e* by which access may be had to the lamp, and the second *d* in which is placed the object to be shown. The light from the lamp *f* is reflected by a mirror *i*, and is concentrated on the object d^1 by the condensers *m*, *n*. The lenses *q* in the adjusting-tube *r* then throw an image of the object on the screen. At the bottom of the compartment containing the lamp are air-holes *g* and a shoe *h* for holding the lamp; at the top is a slot for admitting the chimney. A gas burner may be used instead of the lamp shown.

FIG. 1.



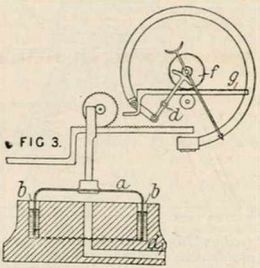
46. Hartley, F. W. Jan. 7. [*Provisional protection only.*]

Magic-lanterns.—A magic-lantern is combined with a "phenakistiscope" or zoetrope for representing on a screen objects in apparent motion. For this purpose, rapidly-moving pictures of the object in successive phases of its motion are so arranged with relation to the lantern as to be successively projected on the screen.

61. Norton, J. L., and **Bailey, W. H.** Jan. 7.

Thermometers; barometers; anemometers.—Relates to registering-apparatus. In one form of registering-thermometer, a mercurial tube is ben as shown in Fig. 7 and supported on a pivot which carries a toothed quadrant gearing with a pinion on the axle of a pointer. On the same axis is a wheel *a* which operates a rack *b*, carrying a marker which records the temperature upon a graduated paper or other surface carried on a cylinder driven by a clock movement. As the temperature varies the height of mercury in the tube and the angular position of the latter will vary. In the form shown in Fig. 6, the rack *b* is operated from an axis which receives motion from two curved metal strips *c*, *d*, soldered together and fixed at one end. The other end is connected to a toothed quadrant, and moves it as the curve of the metallic strips alters on account of their unequal expansion and contraction. The quadrant may be

FIG 3.



actuated by a metallic wire acting upon one side of it in opposition to a spring on the other. To save

space, the wire may be carried backwards and forwards over rollers, from the quadrant to the fixed point. For recording the temperature of liquids, the quadrant is operated by a porcelain rod, of which one end is attached to the tail of the quadrant and the other to the bottom of a brass tube immersed in the liquid under observation. The open end of the tube is fixed, and the rod passes down it clear of the sides. In the case of barometers, a Bourdon tube is fixed at one end and at the other is connected, by a link, to a toothed quadrant which gears with a pinion on the spindle of a pointer. On the same axis is a toothed wheel gearing with a rack carrying a marker, which records on a graduated paper the varying pressure of the atmosphere. The paper is carried on a cylinder driven by a clock movement. For registering wind pressures, a column of water is used with a float to actuate the registering-mechanism, or the means described in Specification No. 2383, A.D. 1863, may be used. If a dome *a*, Fig. 3, be used with its edges dipping in a trough of mercury *b*, *b*, and fluid under pressure brought to it through a pipe *d*, the indicating and recording mechanism is operated by a rack fixed on the dome as shown.

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123. Lewis, C. W., [*Julian, H. G.*]. Jan. 14. [*Provisional protection only.*]

Levels; clinometers.—A graduated circular plate is fixed in a perpendicular position on a base and in front of a circular piece of glass with a cavity behind partly filled with spirit.

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363. Domenech, J. M., and **Jonte, F. P.** Feb. 3.

Tripod stands.—The legs of a tripod for supporting a portable camera case for outdoor use are made telescopic, and their upper extremities are formed with open slots so that they can be readily attached to or removed from the bolts *u*, which are permanently fixed to the tripod head *t* secured to the camera case by the screw *v*.

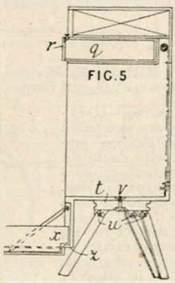

FIG. 5

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529. Wollheim, L. Feb. 18. [*Provisional protection only.*]

Barometers; thermometers.—Relates to "combined barometers and thermometers." The apparatus, as adapted for measuring atmospheric pressure, consists of two vessels, one closed and the other open, connected by a tube, and containing mercury, or other suitable fluid, the closed vessel containing a certain quantity of air. The vessels are so connected to the beam of a balance that any passage of mercury from one vessel to the other, owing to a change of atmospheric pressure, affects the balance, the pointer moving over a scale of pressures or altitudes. To compensate for temperature, a closed vessel nearly filled with mercury, or an arrangement of rods of two different metals, is supported on the other beam of the balance. For large ranges of pressure, a weight may be placed on one side of the beam. To render the apparatus portable, the beam may be raised off its bearings by a contrivance which, at the same time, closes the open vessel with an elastic cover. The apparatus may be used as a thermometer by removing, or turning at right-angles to the beam, the vessels affected by the atmospheric pressure.

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701. Solomons, B. Feb. 29. [*Provisional protection only.*]

Telescopes.—Relates to the adjustment of the eye-piece and the application of an achromatic eye lens. The tube into which the eye-piece fits is provided with two bayonet slots into which take two projections on the eye-piece. The tube is also provided with two scales to suit the powers of the ordinary and the achromatic lenses, the latter being arranged in a second eye-piece also provided with projections.

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732. Harrison, J. W., and **Harrison, C. R.** March 3. [*Provisional protection only.*]

Parallel rulers.—For drawing parallel lines at definite distances apart, the connecting-links are graduated, the marks being brought opposite the inner edge of one of the parallel bars. Several scales may be provided on the same link or on different links.

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754. Newton, A. V., [*Creuzbaur, R.*]. March 4. [*Provisional protection only.*]

Specific-gravity estimating-apparatus; thermometers.—Relates to the combination with liquid meters of any kind of apparatus for recording the specific gravity and the temperature of spirits passing through the meter. Within a closed cylindrical vessel, which has an emptying-spout near its

base, is fitted a concentric cylinder about 2 inches shorter than the external one. Within the inner cylinder is an annular float which has on the top six equidistant cylindrical necks which in pure water stand almost entirely out of the liquid, but in pure alcohol are almost submerged. Fixed in the central space of the float is a mercurial thermometer open at the top and extending through the top of the outer closed vessel. This carries a marker which rises and falls with the varying specific gravity of the spirit which flows upward around and through the float. Within the thermometer is a rod which rests upon the mercury and passes out at the top, and also carries a marker to record variations of temperature. These markers are pressed by springs against a band of paper drawn over a supporting-roller, by another roller actuated by a ratchet and pawl movement driven from the indicating-mechanism of the quantity meter. Friction rollers keep the graduated paper in position on the supporting-roller over which it is drawn from a supply roller. The lower line indicates the specific gravity, and the vertical distance between the two lines indicates the temperature.

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799. Warner, W. H., and **Murray, R. C.** March 7. [*Provisional protection only.*]

Stereoscopes. — To enable larger pictures than usual to be viewed, the platform for supporting them is placed farther from the lenses, the focal length of the lenses being correspondingly, or still further, increased. Thin lenses are used, and the convexity is greater on the side towards the pictures than on the other side. The lenses are elliptical in form, with the major axis corresponding with the height of the picture.

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843. Paget, F. A. March 12.

Compasses, magnetic.—Relates to various arrangements of compasses with short needles. Methods of demagnetizing iron ships are described in the Provisional Specification. Two or more short needles are arranged one above another in a vertical plane. In some cases, two columns of needles are used, one on each side of the pivot. In the case of tubular compasses, a number of short needles are strung on the tube, being separated by washers of aluminium or ebonite; or two or more sets of needles are arranged on either side of the tube. In the latter case, "bar edge" needles are used; they are fixed to the sides of the tube by screws and plates of aluminium. The tube is also made of aluminium. In the case of an axis compass, the needles may be strung on, or placed in slots in, the axis, adjustable counterweights being fitted on the axis at right-angles to the axis of the needles. In a modified arrangement, the axis, which is preferably of aluminium, is provided with a pivot at the top and bottom and fitted on both sides of the axis with a vertical bar or bars of aluminium on which a number of magnets are fixed edgeways in pairs. The card is fixed between the needles, being held in place by the bars, which pass through it; it is steadied by a cross-piece of aluminium. The needles may also be arranged on the card. In another form, the needles may be arranged some distance above the deck on a spindle consisting of a light tube of aluminium which is connected at the lower end to the compass card by central gimbals. To prevent deviation of masthead compasses, the fittings on the mast are made of gun metal or other such alloy, or of iron alloyed with manganese or antimony. The needles used are preferably lozenge-shaped. They are preferably made of cast steel with a high percentage of carbon, titanium, and boron, and are hardened before magnetization in a solution of sal-ammoniac, and afterwards by boiling in linseed oil. To magnetize the needles, they are laid with their ends on the opposite poles of two electromagnets and rubbed with a third magnet. The cards are of talc, with or without a ring of aluminium or ebonite; or they may be of a stamped aluminium. Cards on which the points are marked on the outside of a zone may be used to enable the compass to be placed as high as possible above the deck. The bowls are made of pewter. The Provisional Specification states that the central weight at the bottom of the bowl is suspended from a universal joint or a ball-and-socket joint or gimbals. The binnacles are made partly or wholly of metal instead of wood, the metal used being gun metal or other such alloy, or an alloy of iron with manganese or antimony. They may be made with a joint below deck so that they can be lowered out of the way when necessary. The Provisional Specification describes a method of demagnetizing ships by temporarily winding insulated wire round the hull at right-angles to its length. Currents of electricity are made to flow through the wire while the ship, or parts of it, are made to vibrate. The separate plates of the ship may also be rubbed with magnets. Reference is made to Specifications Nos. 227 and 3209, A.D. 1866.

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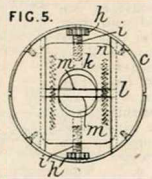
889. Elliott, F. H., and **Elliott, C. A.,** [*Bardou, P. G.,* and *Bardou, D. A.*]. March 16.

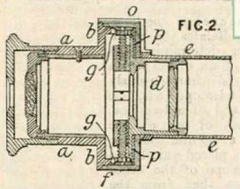
Telemeters. — Distances are ascertained by a telescope provided with means for observing the apparent size of known objects. The eye-piece *a* has a flange *b* and ring *f* graduated for viewing infantry or cavalry respectively. A circular frame *c* is fitted on the front end of the tube *a*, and carries at the back a tube *d* which is fixed into the telescope tube *e*. On the flange *b* are teeth *g* gearing with pinions *h* on the ends of screws *i* working into

FIG. 5.



female screws in slides *k*. The slides *k* move in guides *l* in the frame *c*, and carry hairs *m*, kept parallel by springs *n*. A friction plate *p* is provided between the frame *c* and the ring *f*. When the eye-piece and the ring *f* are turned, the pinions *h* are caused to rotate, moving the slides *k* with the hairs. When the object is taken in between the two hairs, the distance is indicated by a pointer *o* on one of the scales. One wire *m* may be fixed and only one movable. The Provisional Specification describes an arrangement in which one hair only is moved by a pin working against the internal cycloidal form of the ring *f*; or it may be worked by a pin in a cam-groove.

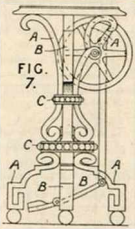
FIG.2.



951. Taylor, W., and **Taylor, C. E.** March 20.

Stands.—The frame of a stand, which may support a table top for garden or restaurant use, &c., or be shaped to receive a lamp, vase, or other receptacle, consists of two metal parts A and B, which are adapted to be fitted together by passing one over or through the other and are secured together by one or more rings C bolted round them.

FIG. 7.



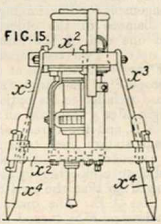
984. Barclay, A. March 23. [*Letters Patent void for want of Final Specification.*]

Barometers; thermometers.—Relates to the combination of non-mercurial barometers and mercurial thermometers with watches, clocks, and other instruments, and to devices for registering the variable readings of thermometers and barometers. In combining a barometer with a watch, a barometer is arranged to indicate on a dial on the opposite side to the watch dial; or one dial may serve for both. The barometer consists, in one arrangement, of a thin exhausted tube which encircles the mechanism of the watch. By means of a lever, rack, and pinion, the free end of the tube moves the indicating-needle in accordance with the atmospheric pressure. The tube may be held at its centre instead of at one end; or an ordinary aneroid barometer may be employed. A thermometer composed of a metallic tube filled with mercury may be connected to similar indicating-apparatus in like manner; it may be used in connection with the combined barometer and watch, or separately. A diagram, showing the variations of temperature, may be obtained by causing the expansion and contraction of the mercury to operate an indicating-arm which carries a pencil. The pencil bears against a graduated travelling band of paper, or against a graduated rotating disc, which is operated by clockwork in any suitable way. The readings of barometers may be recorded in a similar way.

1183. Lake, W. R., [*McKean, J. A.*] April 8.

Tripod and luke stands.—Relates to stands, with three or more adjustable legs, for rock and other drills. The stand consists of pieces x^2 bolted to standards x^3. The lower piece is provided with holes at the angles for the insertion of steel-pointed adjusting-pins x^4. The trunnion of the motor cylinder fits in a hole in the upper piece.

FIG.15.

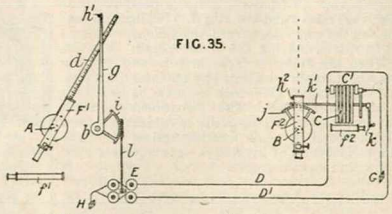


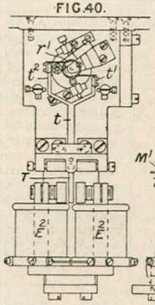
1185. Beningfield, E. April 8. [*Provisional protection only.*]

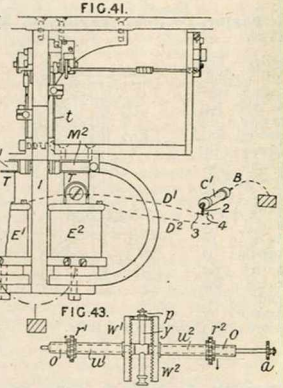
Tripod stands.—Relates to a portable fire-escape applicable also as a tripod stand for supporting staging &c. Three legs of metal tubing, hinged near their centres, are connected by pins to a crown plate. A pin on each leg takes into a hole in the plate and prevents the legs from being spread out too far. When used for scaffolding &c., planks or platforms are suspended from the crown plates of two of the stands.

1253. Siemens, C. W., [*Siemens, W.*]. April 17.

Telemeters; position-finders. — Relates to apparatus for determining the distance of an object which is observed simultaneously by two telescopes &c., one at each end of a base line. By means of an electric current a pointer at one station is placed parallel to the telescope of the other station, so that, from the triangle formed by the pointer, the telescope at the first station, and the straight line connecting the stations the distance of the object can be calculated. According to the present invention, the motion of the pointer is produced by means of a "sun and planet wheel "system," arranged so that, as one or other of two wheels with which the planet-wheel is geared is operated by the current, the pointer is moved by the planet-wheel in one direction or the other. The transmitting-arrangement consists of a magneto-electric machine; when the armature is rotated in one direction one of the wheels at the receiving-end is operated, and when it is turned in the other direction the second wheel is operated. Fig. 35 shows the general arrangement for determining the distance of the object from one end of the base line only. Two telescopes





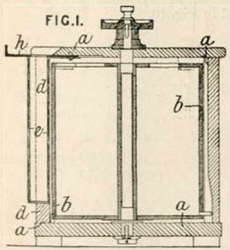


F¹, F² are mounted one at each end of the base line A B, and are each fitted with cross-hairs. The telescope F¹ at the end A from which the distance is to be calculated is attached to a graduated straight-edge *d* parallel to its optic axis and sliding over a plane surface as the telescope moves. A second straight-edge *g* turns on an axis *b* in the line A B. The distance A *b* is a definite fraction of the base line A B, and the three points A *b* B are brought into line by directing the fixed telescopes f^1, f^2, one at each station, each towards a fixed mark at the other station and adjusting their cross-hairs. At the commencement of observations the axis of the telescope F² and the straight-edge *g* are placed parallel to each other by bringing the telescope and straight-edge against the two stops h^1, h^2, which are arranged so that the axis of the telescope and the edge of the straight-edge make equal angles with the base A B. The operators at the two stations then direct their telescopes on the distant object; the telescope F¹ is turned directly by hand, and the telescope F² by a handle *k* which rotates a spindle k^1 having a worm gearing with a quadrant *j* on the axis of the telescope. A spur-wheel on the spindle k^1 at the same time turns a pinion on the shaft C¹ of the armature of a magneto C such as that described in Specification No. 2107, A.D. 1856. The currents thus produced pass by means of two line-wires D, D¹ and two earth plates G, H, into the electromagnetic receiver E, by which a shaft *l* is rotated; this shaft carries a worm gearing with a quadrant *i* on the axis *b* of the straight-edge *g*. Thus, if the two worms are rotated in the same direction and to an equal distance, the straight-edge *g* will remain parallel to the telescope F², and the distance of the object can be calculated, or, if the straight-edge *d* is suitably graduated, can be read off directly, the lengths A *b*, A B being constant. The armature C¹ of the magneto C carries an arm 2, Fig. 41, which makes contact with one or other of the terminals 3, 4 of the two line-wires D¹, D² according as the armature is turned in one direction or the other, the other end of the armature coils being earthed at B, Fig. 41. The electromagnetic receiving-apparatus consists of a double polarized 'relay,' Figs. 40 and 41, consisting of two polarized

electromagnets E^1, E^2 with permanent magnets M^1, M^2. Two tongues T are arranged one on each of the upright I; each tongue carries an extension t with two forked arms t^1, t^2, each carrying a spring pawl acting on a ratchet-wheel r^1, Fig. 40. These pawls are so arranged that, at each oscillation of the fork t, one pawl drives the wheel and the other slides over a tooth: the wheel is thus rotated in the same direction through the distance of half a tooth at each stroke of the tongue. Fig. 43 shows the two ratchet-wheels r^1, r^2, one driven in one direction by currents through the wire D^1, Fig. 41, and the other in the opposite direction by currents through the wire D^2. The wheels r^1, r^2 are mounted on sleeves w^1, w^2 on the spindle o, which sleeves carry crown-wheels w^1, w^2 gearing with a pinion p on a counterweighted arm y attached to the spindle o. By this arrangement of differential gearing, when one of the ratchet-wheels r^1, r^2 is turned through any angle, the arm y on the spindle o is turned through half the angle. A spur-wheel a on the spindle o gears with a wheel with half its number of teeth on the spindle l, Fig. 35, which is consequently driven through the same angle as the ratchet-wheel r^1 and r^2. For ascertaining the distance at both points of observation, each station is provided with a magneto and receiving instrument, and each telescope is worked by a handle and worm gearing. The telescopes may be replaced by ordinary sights, and the plane surfaces over which the straight-edges move may be divided into small squares, numbered to indicate the distances. The worm driving the telescope quadrant may be worked by chain gearing from the spindle carrying the handle. In a modification, the scale is observed in the telescope at the receiving-station by means of a reflecting-arrangement. The apparatus, shown in Fig. 35, may be also applied to indicate the passage of a vessel over a torpedo &c. A chart of the mine field is placed under the straight-edges d, g. Both observers keep their telescopes directed on a fixed part of the vessel, and the moving crossing-point of the two straight-edges indicates the course of the vessel. The chart must be on such a scale that A b on the chart represents the distance A B.

1297. Bing, L. April 21.

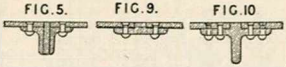
FIG.1.



Actinometers.—The light is caused to fall on a surface in such a way as to produce a graduated series of shades which are defined by a graduated figured scale. A sheet of photographically-sensitive paper is applied to the surface thus lighted for a determinate time, and a graduated representation of the progressive change of tone from light to darkness is thereby obtained. By this arrangement the photographer is enabled to expose his plate or printing-paper for the time requisite to produce determinate results. The form of apparatus preferred consists of a dark box a, in which is mounted, on a vertical axis, a cylinder b to receive a sheet of sensitized paper. The paper is secured to the surface of the cylinder by springs. One side d of the box is movable and has a vertical slit cut in it. In the slit is mounted a glass tube e of square cross-section, having three sides of yellow glass, and the fourth side of transparent glass with the above-mentioned scale marked thereon. The movable side is pressed against the cylinder by springs. The top of the tube has a horizontal slide h for shutting off or admitting the light. The light admitted to the tube acts on that portion of the sensitized paper which bears against the transparent side of the tube. The cylinder can be rotated, so as to receive successive impressions, and the impressions may be compared with one another. The graduated scale is produced by geometrical projection, upon the supposition that the light falling on the horizontal section of the top of the tube is of equal intensity in every part. Instead of a single tube, a series of tubes varying in length or diameter may be used, or "hollow or solid bodies of the "form of the parabola, ellipse, hyperbola, or sphere, "or of any other suitable form whereby determinate "graduations of shades may be produced."

1300. Johnson, J. H., [*Arson, L. F. A.*]. April 21.

FIG.5. FIG.9. FIG.10

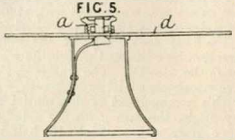


Compasses, magnetic, correcting errors of. The hulls of iron ships are divided transversely into two or more magnetic elements by means of strips or bars of copper or other non-magnetic material. The compass is placed symmetrically with respect to the various elements so formed. Figs. 5, 9, and 10 show various ways in which the non-magnetic material may be inserted. Armour-plates are placed with a little space between them, and are separated from the hull by a layer of hard wood.

1443. Johnson, J. H., [*Langlois & Co.*]. May 2.

FIG.4

FIG.5.



Microphotoscopes.—Minute photographic pictures are mounted on two or more "Stanhope" lenses or on a strip which may be moved under a single lens. In this way, by using pictures of the same object in different positions, the effect of motion may be produced. Fig. 4 shows one form of apparatus, in which two lenses carrying pictures may be moved to-and-fro in front of an eyepiece by the button *a* and elastic spring *b*. Several sets of lenses may be mounted radially or otherwise in one frame, and the details of construction may be variously modified. Fig. 5 shows an arrangement in which a series of pictures on a strip of glass *d* may be brought under an adjustable lens *a*.

1490. Holt, S., and **Kearsley, J.** May 6. *Drawings to Specification.*

Telescopes.—Relates to railway signalling and communicating apparatus, and comprises arrangements of telescopes on trains or otherwise for observing signals &c. The telescope is carried by a spring-supported platform, and has pads for the observer's forehead to lean against. Rotary or other rubbers or water jets may be supplied for cleansing the object glasses, which may be protected by hoods regulated by screws and handles.

1498. Green, R. A. May 7.

Compasses, drawing.—Relates to joints or pivots for compasses, clips, &c., shown in Figs. 9 and 10 as applied to a newspaper clip. The joint consists of two ring bearings *a*, a^1; one ring *a*, as shown separately in Fig. 10, has a step or shoulder cut round it to receive the other ring a^1. The two rings are kept together by burring the upper edges, or by discs and a set-screw, as indicated in Fig. 10.

FIG.9

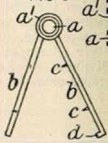
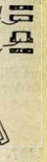


FIG.10.



1512. Husband, W., and **Dœring, F. B.** May 8.

FIG.2.

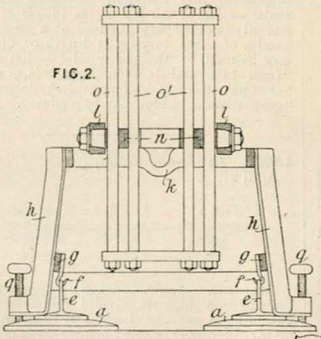
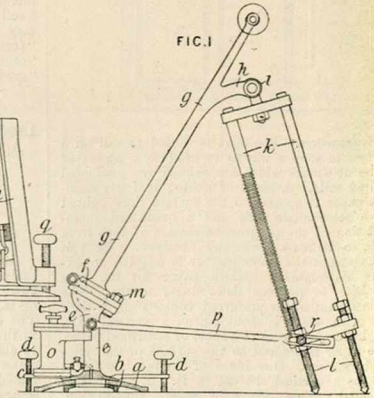


FIG.1



Tripod and like stands.—Relates to frames or supports for rock boring or excavating machines. The leather, rubber, or other airtight disc *a*, Fig. 1, is placed on a layer of clay, when the ground is uneven, and it is secured between the plates *b* and *c* of smaller diameter than itself. The plate *c* is formed with projecting pieces to receive the adjusting-screws *d*, and also with a

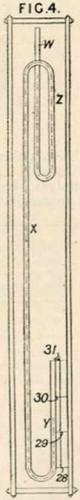
central stem *e* to which the air pump *o* is attached. The arm *g* is connected to the stem by the ball-and-socket joint *f*, and to the upper part is attached a rope pulley for lifting the machine. From the lug *h* on the arm *g* a cross-bar is supported by the joint pin *i*, and to it the rods *k* are attached. These support a lower cross-bar into which the adjusting-screws *l* are tapped. The stay rod *p* is bolted to the stem *e* at one end, and at the other is formed with a slot to suit different inclinations of the rods *k*, and the screw *r* secures it when in position. When the air is exhausted from below the disc *a*, either by the pump *o* or by condensed steam, the machine is fixed by clamping the joint *f* with the screw *m*. In the arrangements shown in Fig. 2, a disc *a* as before described is employed, and the upper plate *e* is supported from the uprights *h* by the cross-bars *g* and the hooks *f*. A circular frame is supported by the uprights *h*, and bearings *k* are formed in it to receive the trunnions of an inner ring *l*. This is similarly formed to receive the cross-shafts *n*, and this arrangement admits of the bars *o*, *o*¹ taking up different inclinations. By raising the supports by the screws *q*, a vacuum is formed beneath the disc *a*, and the machine is supported thereby. For shaft sinking, the supports consist of the adjusting-screws *l*, Fig. 1, rods *k*, and cross-bar attached thereto. The latter is connected by two arms and a ball and socket to a pair of overhead beams.

1606. King, H. J. H., Auchinvole, J., and Patrick, A. May 16.

Barometers.—The tubes are bent as shown in Fig. 1, and the lower parts are filled with mercury and the upper parts with a lighter liquid, preferably a mixture of water and glycerine. The height is read from a tube visible through an opening in the side of the case. An elastic diaphragm 10, which may be replaced by an elastic cylinder, excludes dust from the tube 9. A flattened tube may be used, or tubes of varying thickness and glass casings may be used to act as magnifiers. The Provisional Specification states that floats may be placed in the tubes to register maximum and minimum pressures. In order to obtain an enlarged scale, the form shown in Fig. 4 is used. A closed downward bend Z is made on the tube X, of larger area than the bend Y, so that the mercury in the bend Z may not separate. The bend is continued upwards to W, and its ascending part is partly filled with glycerine.

FIG. 1.

FIG. 4.



1665. Chapman, C., and Lilley, J. May 21. *Drawings to Specification.*

Compasses, magnetic.—The compass card is made with apertures at the cardinal points, beneath which are printed instructions for indicating the "rule of the road" on another card, so that they can be read through the apertures. The rules may, however, be printed on the card itself, or may be placed in any other part of the apparatus.

1709. Cameron, P. May 25.

FIG. 1.

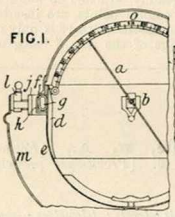


FIG. 4.

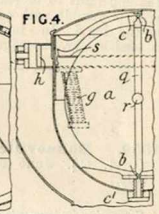
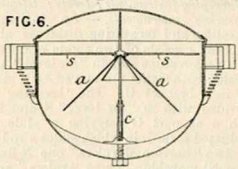


FIG. 6.

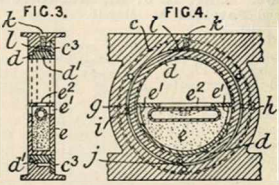


Compasses, magnetic.—Relates to a form of compass for indicating a ship's course independently of celestial or terrestial observations. The application of the invention to steering-compasses is also described. Instead of a needle, a disc *a*, Fig. 1, is employed, which is magnetized in the direction of the fibre and supported on pivots *b* in

bearings in a ring *d* inside the weighted bowl *e*. An arc *o* over the disc *a* indicates the dip. The bowl has a rim *f* which rests on an india-rubber tube *g* carried in the gimbal ring *h*. The gimbal rim *j* is pivoted to a movable graduated ring *l*, which is supported on the stand *m*. The apparatus is fixed with a mark on the ring *l* in a line with the longitudinal axis of the ship. To find the course of the ship, the ring *l* is turned until the disc *a* is perpendicular, when the reading on the said mark will indicate the course. To find the deviation of the steering-compass due to the influence of the ship's hull, the compass is turned round until the disc assumes the greatest dip, as indicated by the arc *o*, thus giving the correct deviation. The disc is adjusted by moving a small brass ball in a slot in the centre of the disc by means of a screw. Fig. 4 shows a steering-compass. The disc *a* is held in a vertical strap *q* by a pinching-screw *r*, the strap being supported in bearings *b*, *b* in the bracket *c* and the screw c^1. The card *s* is fixed on the disc in a horizontal position. The bowl *e* is supported by springs *q* from the gimbal ring *h*. In a modification, Fig. 6, the disc *a* is cut into segments and placed at an angle under the card *s*, which turns on a vertical pivot carried in a tube *c* with a spring at the bottom.

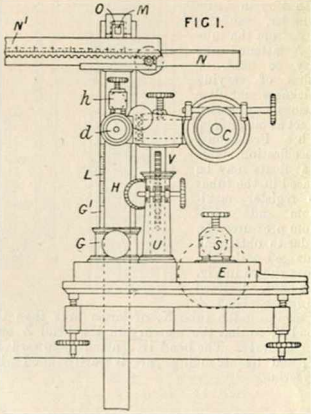
1793. Lake, W. R., [*Davis, L. L.*]. May 30.

Levels; clinometers.—The bubble case can turn in a socket on the base, so that it may be set at any angle. The frame consists of two parallel straight edges, one forming the base, with a web connecting them. A socket *c* is formed in the frame, and into this fits a ring *d* carrying the bubble case *e*. The central portion d^1 of this ring turns in a recess in the socket, and is kept in place by a flange ring c^3. A spring *l* with adjusting-screw *k* is provided between the socket and the ring *d*. The bubble case *e* has holes e^1 at its ends, so that a broken glass can be easily replaced, and the bubble is observed through apertures e^2. An index is fixed to the case *e* by two screws (one in a slot for adjustment), which indicates on a scale on the ring c^3 the degree of inclination. To allow the apparatus to be readily adjusted to show true horizontal and perpendicular positions, screw tops *g*, *h*, preferably with conical points, are inserted in the socket, and corresponding stops *i*, *j* are formed on the ring *d*. In a modification, there is only one straight edge, which forms the base, and the socket is semicircular, the edge of the ring *d* being milled to facilitate turning.



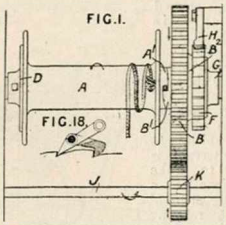
1859. Bonneville, H. A., [*Eckhold, C. A. C.*]. June 6. [*Provisional protection only.*]

Surveying-instruments; levels; telemeters; angle-measuring instruments. — An instrument "for "levelling and measuring distances, altitudes, and "angles" consists of two sights *c* and *d*, the latter with a microscope and an "air level" *h* for reading a scale; both sights are moved by a piece V working in a bracket U. The "levelling ruler" E is provided with an "air level" S, and is combined with a support G carrying a slide G^1 with a graduated scale L in which slides a rod H supporting two "horizontal rulers," one N fixed, and the other N^1 movable. These "rulers" are combined with a "little window" *o* furnished with a pane resting on the upper ruler and movable in a frame M placed above the slide.



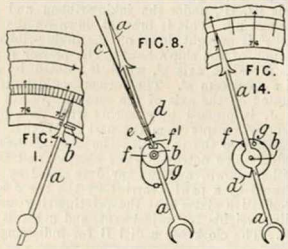
1867. Weston, T. A. June 6.

Stands for cameras. The frictional gear described below, as applied to a crab or winch, may be applied to stands having rack-and-pinion elevating-gear. On the shaft are secured a collar D and ratchet-wheel F. The latter is prevented from moving endwise by a collar G, and from turning backwards by a pawl H. A winding-barrel A and spur-wheel B are mounted loosely on the shaft, their contiguous faces having inclined or screw paths A^1, B^1 in contact with one another. The wheel B bears against the wheel F, and its boss B^2 is of larger diameter than the inclined faces. A pinion K, on a shaft J, squared at the ends to receive handles, gears with the wheel B, and, when it is rotated to lift a load, the inclined faces, which have a slight play, ride over each other until the barrel A and wheel boss B^2 are jammed against the collar D and wheel F respectively, when lifting commences. When the handle is turned to lower, the handle can only follow the wheel B, and if the movement is stopped the load will at once jam the barrel and wheel, and will be held by the pawl H. The inclined faces, ratchet-wheel, and collars may be fitted to the pinion shaft. The friction surfaces may be of metal, if lubricant is used; otherwise, one should be of iron, and the other of wood. By introducing between the friction surfaces discs such as described in Specification No. 263, A.D. 1863, a small amount of end pressure suffices to couple the parts, and the strain on the collars and shafts is reduced. The ratchet-wheel F may be made with internal teeth. A double pawl, as shown in Fig. 18, may be used. The distance between the ends may be the same as between the teeth, so that both act simultaneously, or the distances may vary, in which case the ends are in operation alternately.



2119. Clark, A. M., [*Baudet, P.*]. July 2.

Barometers.—Relates to devices for indicating whether the pressure is stationary, or on the increase or decrease. In one arrangement the index *a*, Fig. 1, has attached to it a flexible blade *b*, which presses at its bottom end upon the dial *c* of the instrument. The direction in which this blade is inclined will indicate in which direction the index-hand is moving. In a modification, the flexible blade is fixed on the end of the index, and rests against pins arranged round the dial. A small disc, coloured differently on its two sides, may be attached to the blade to render it distinct and to indicate, by the colour presented to view, the state of the weather. Fig. 8 shows another arrangement. The index *a* has pivoted on it at *d* a pointer *c*, the motion of which is limited by stops on a piece *e*. Loose on the axis *b* of the index is a grooved collar *f*, against which rest springs *g*. When the index moves in either direction, the end of the pointer *c* will be held on one side by one side of the notch f^1. In another arrangement, a pointer is centered on the axis of the index, and by means of two pins on a T-piece on the pointer, against which the index rests, it will point on either one side or the other of the index. Fig. 14 shows another form; a disc loose on the axis *b* has a notch *d*, in which is a pin on the index. When the index is moving, the pin will press on one side of the notch and will cause one of the figures *f* or *g* to be covered; neither will be covered when the instrument is stationary.



2135. Albini, A. July 4.

Compasses, magnetic. — An automatic record of the course steered by a ship is obtained by fitting, beneath the compass card, a printing-ring O^2, bearing raised letters or signs corresponding to those on the card, which, at short intervals, is caused to make impressions on a travelling strip h^3 or on a rotating disc. The mechanism is actuated by a clock combined with the compass. An endless inking-ribbon d^3 passes over a drum d^3, and over guide-pulleys d^4, d^4, and is kept in tension by a spring d^8. The drum d^3 acts as a reservoir for ink, and supplies the ribbon through holes in its periphery. The paper or other suitable strip is carried on drums H^1, H^2, under the inking-ribbon and over a cushion I, which receives the pressure of the printing-ring. This is brought down on the inking-ribbon by the pressure j^7, and at the same time a rod j^3 is brought down on the inking-ribbon to make a dot on the paper, thus showing the exact direction of the ship's head. The presser j^7 and rod j^3 are carried on a bar J which is operated as follows:—The axis g^1, which is rotated by gearing from the fusee of the clock, carries a lever g^5 and a snail cam g^3. The former has detents g^4, g^6, and g^7 which engage a cam L, (see also Fig. 14), mounted on the axis of the seconds hand of the clock. A lever K, centered at k^1 and jointed to the bar J, is pressed by a spring with its arm k^2 on the cam g^3. At, say, every half minute the detent g^4 escapes from the part l^2 of the cam L; and at the end of the minute the detent g^6 escapes from the part l^1. The cam g^3 then releases the arm k^2, the bar J falls, and the record is printed. The detent g^7 then escapes, and the cam g^3 and lever g^5 are brought round again to the position shown, and the bar J is raised by the cam g^3 acting on the arm k^2. The paper strip is operated by a pawl j^2 carried by the bar J and acting on pins h^5 on the drum H^2. The Provisional Specification states that the printing-ring may be constructed to carry the ink. The needle carries sliding weights for adjustment, and a bar R with set-screws r, r prevents excessive vibration of the card. The clock has a dial B for indicating the time.

FIG. 1.

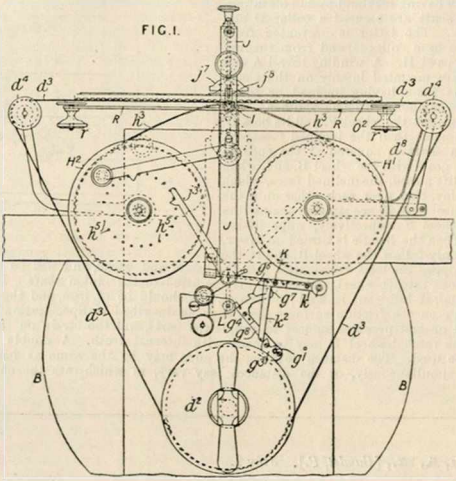
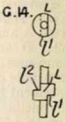


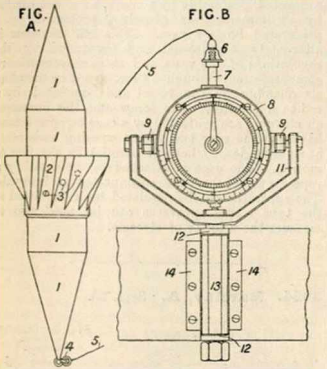
FIG. 14.



2427. Wilson, G. Aug. 1.

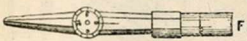
Logs and leeway indicators. — The indicator consists of a circular box 8 pivoted in gimbals 9 and 11 in bearings 12, on a plate 14 fixed to the taffrail of the ship. The box 8 contains the wheel-work, the last wheel of the train being connected with the large index-hand, which indicates miles. The first wheel of the train is worked by an endless screw, and is connected with the small index, which makes one revolution for every tenth of a mile. The side of the dial near the ship is graduated as a compass, and reads against lines on the frame 9 to indicate the leeway. The line 5, which is of wire, is connected to the driving-axle 7 by a screw 6, so arranged that twisting is prevented. The rotator is connected to the line by a universal joint 4; it consists of a float 1 with conical ends, on which is adjustably fixed an outer cylinder 2 having oblique vanes. By means of screws 3 this outer cylinder

can be fixed on the float either backward or forward for causing the float to rise or run deeper in the sea. A reel is used for winding and unwinding the line. The Provisional Specification also



describes a modification in which the indicator is differently mounted and the leeway is registered by a pin pressing on the inside of a cylinder, smeared with oil, in which the box containing the wheelwork rotates.

2432. Bailey, L. C. Aug. 1.

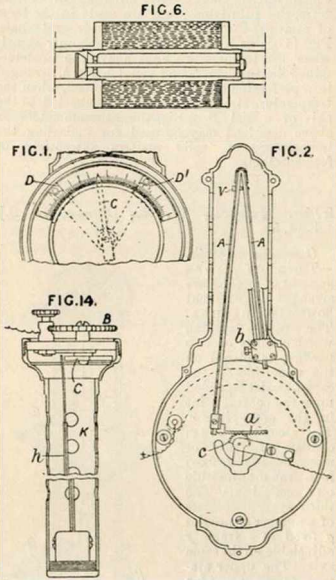


Ruling-pens; compasses, drawing.—The set-screw used to adjust the blades is graduated on its head, so that any division can be brought opposite to a mark on one of the blades. An ink feeder may be combined with the pen consisting of a globe or cylinder with a tapering tube extending between the blades. The opening for the supply of ink is on one side of the reservoir, so that the pen can be laid down.

2624. George, C. Aug. 24. [*Provisional protection only.*]

Horizons, artificial, for use in taking altitudes. Two reservoirs or trays, one containing the supply of mercury, and the other, which is used for observation, provided with a glass cover, are connected by a tube fitted with a stop cock. The mercury reservoir is provided with a valve to admit air or allow for its escape. The cover of the tray used for observation is kept in place while passing mercury in or out of the tray, after which it is removed and a glass is placed on the float to form a clear surface.

2733. Newton, W. E., [*Fournier, J. B. N.,* and *Lemaire, C. A.*]. Sept. 1.

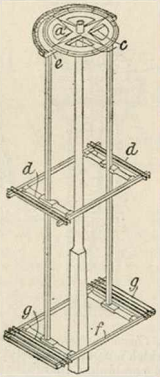


Thermometers.—Relates to thermometers in which a compound metal blade is used, and consists in combining therewith appliances for indicating changes of temperature, or for regulating gas or other heating-apparatus. A compound metal blade A, fixed at *b* and regulated by a screw *v*, is provided with a toothed rack *a* which gears with a sector *c* on the indicating-finger C. The finger C moves over a dial provided with two adjustable stops D, D', and both the finger and the stops are placed in circuit with an electric battery. When it is desired to maintain a temperature of from, say, ten to twenty degrees, the stops are placed on the numbers ten and twenty on the dial. If the temperature varies beyond these limits, the finger C comes into contact with one of the stops and completes the circuit, which operates a bell or other signalling-apparatus. Different signals may be given for a rise or fall in temperature. The

electric current may be caused to operate the valve of a gas-heating apparatus through an electro-magnet, or through a solenoid or bobbin as shown in Fig. 6. The core is formed of an iron tube or a copper tube surrounded by soft iron wire. In a modified thermometer, constructed to give several different signals, two compound metal blades are arranged between adjustable stops, which form contacts to complete electric circuits. In another form, the adjustable stops are made in the form of cams fixed to the spindles of two separate dials. Fig. 14 shows a further form, which only signals when the temperature rises above the predetermined limit; a compound metal blade *h*, arranged in a perforated casing K, makes contact, when the temperature rises, with a cam C connected to the axis of a dial B. Signalling-thermometers as above described may be used for indicating the temperature of solid matters susceptible of fermentation.

2743. Newton, W. E., [*Strouse, D. B.*]. Sept. 5.

Compasses, magnetic.—Three or more systems of needles are arranged in different horizontal planes. The upper system, which consists of two needles, is placed on the underside of the card *a*, and is suspended upon the central point in the cross-piece *c*. The second system consists of two or more needles *d*, fixed in a frame adjustable on a vertical axis. The third system consists of a number of needles *g* fixed in a frame *f* adjustable on the same axis. The upper system serves as the directive needle to indicate the magnetic meridian. The second system corrects the upper, counterbalancing any effect due to local disturbance. The third system is to effect the horizontal adjustment of the second, and thus enable the latter to move in advance of the directive needle and keep it correct. A graduated disc *e* is attached by a bar *c* to the top of the central spindle of the two lower systems, to show the difference in conduct of the directive needle and of the lower needles, and thereby to determine the extent of local disturbance. The second and third systems may also be arranged above the card.



2913. Brooman, C. E., [*Bonaré, A.*]. Sept. 22. [*Provisional protection only.*]

Logs; current meters.—A vane or screw, immersed in the water and dragged by the ship, is connected, preferably by a crank, to a rod carried by an immersed air chamber, protected by a perforated box or case. This air chamber is alternately compressed and expanded by the revolutions of the vane, and these movements are communicated, through a tube, to a corresponding air chamber on the vessel and connected by a rod to a counter. The screw and the immersed air chamber are protected by a cage or open frame, having at the rear two plates crossing each other at right-angles, to keep it parallel to the line of motion. The cage is attached to the vessel by a rope, to which the tube is connected at intervals. The apparatus can be regulated by a tap fitted to the tube. This apparatus can be used also to measure the velocity of streams.

2924. Barclay, A. Sept. 23.

FIG. 4. *(Sheet 1)*

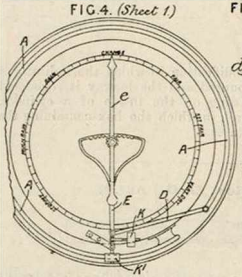


FIG. 5. *(Sheet 1)*

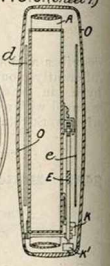
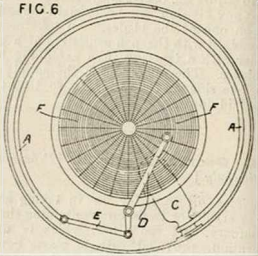


FIG. 6



Barometers; thermometers.—Relates to the construction of recording or non-recording barometers and thermometers, and to the combination of the

same with watches, clocks, and other instruments. A barometer is formed by fixing one end of a curved vacuum tube A to its enclosing-casing and connecting its opposite end to a pivoted lever E by means of a link D. The lever E is provided with an internal rack which gears with a pinion to which the indicating-finger *e* is attached. Counterweights K, K¹ are attached to the lever E to prevent errors of indication in certain positions, and the link is made of a more expansible metal than the tube. Figs. 4 and 5 show the barometer combined with a watch; glasses *o* are fitted in the sides of the enclosing-case, so that the hands *d* of the watch or the indicator *e* of the barometer may be seen. An aneroid barometer or a barometer similar to a "Bourdon" gauge may be used. Fig. 6 shows a form of recording-thermometer. A curved tube A, containing mercury, spirit, or other liquid, is fixed at one end to its enclosing-casing and connected at its opposite end to a lever D by means of a link E. The lever D carries a pencil which records the variations of temperature on a disc F rotated at a definite speed by means of clockwork. A bulb C may be formed at the end of the tube A. A recording-barometer is similarly constructed, but the disc F is replaced by an endless sheet travelling over drums. A thermometer constructed as shown in Fig. 6, but provided with an indicating-finger in place of the recording-apparatus, may be combined with the watch and barometer shown in Figs. 4 and 5. In another form of recording-thermometer, the mercury &c. is contained in a metal bulb or reservoir and in an elastic tube which rises vertically therefrom. Expansion or contraction of the mercury &c. causes the tube to lengthen or shorten, and so give vertical motion to a pencil which is in contact with a rotating disc. In a further form, the reservoir is of different shape, and is provided with tubes for increasing the exposed surface of the instrument, and the recording-pencil is carried by a pivoted lever.

2986. Girdlestone, H. J., and **Girdlestone, J. W.** Sept. 29. [*Provisional protection only.*]

Compasses, magnetic.—To connect and prevent deviations due to the action of iron &c. ships, parts of the ship and fittings are depolarized by means of electric spirals as described in Specification No. 2592, A.D. 1867, or by permanent magnets or electromagnets; or other parts may be polarized to such an extent that the compass will be accurate at the bearing in which the ship lies during the operation. The same operation may be performed for other bearings, or any remaining deviation there may be at any other bearing may be ascertained and tabulated on swinging the ship. The two methods of depolarizing and polarizing may be combined. Specification No. 227, A.D. 1866, is also referred to.

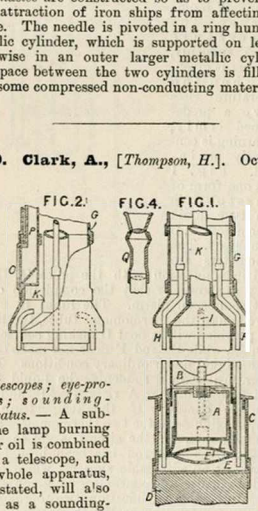
3069. Bentham, R. H. Oct. 7. [*Provisional protection only.*]

Rulers for drawing radial lines. A rolling ruler is provided with two wheels of unequal size, movable along the axis common to both wheels, so that lines more or less convergent can be drawn. To retain the ruler flat on the paper, the axis at one end is raised or depressed, and adjusted by a screw motion. The wheels may be made removable, and ordinary wheels substituted to form a parallel ruler.

3091. Newton, W. E., [*Olsen, C. O.*]. Oct. 8. [*Provisional protection only.*]

Binnacles are constructed so as to prevent the local attraction of iron ships from affecting the needle. The needle is pivoted in a ring hung in a metallic cylinder, which is supported on legs or otherwise in an outer larger metallic cylinder. The space between the two cylinders is filled up with some compressed non-conducting material.

3190. Clark, A., [*Thompson, H.*]. Oct. 19.

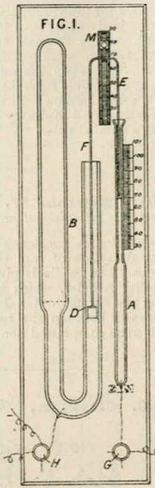


Telescopes; eye-protectors; sounding-apparatus. — A submarine lamp burning gas or oil is combined with a telescope, and the whole apparatus, it is stated, will also serve as a sounding-pole. A cylinder C, weighted at D, encloses the lamp A, and to it is fitted in a water-tight manner the glass B extending between the cylinder C and flue K. Air and gas supply tubes H, I, F connect the upper and lower parts of the lantern, and serve to protect the glass; they pass through a protecting-tube G. Near the bottom of the tube G is a glazed opening O, behind which is a telescope tube P, fitted with reflecting and other lenses. To protect the eye of the observer, a yielding tube Q is interposed between the eye-glass and the telescope tube. The apparatus is portable, being formed in suitable lengths with water-tight joints.

3304. Tongue, J. G., [*Leblan, J.*]. Oct. 28.

Thermometers.—Relates to a fire and temperature alarm apparatus for use in buildings, vessels, mines, and other places. Two thermometers of unequal sensitiveness are combined with electric alarm apparatus, so that normal variations of temperature do not bring the signal apparatus into action. When, however, the temperature changes suddenly, a warning is given, and, when the temperature rises above a predetermined limit, the warning is continuously maintained. Fig. 1 shows one form of apparatus, in which two liquid thermometers A, B are employed. The thermometers are placed in connection with the poles G, H of a battery, as shown, so that the completion of the circuit sounds an alarm. The limbs E, F of a bent rod enter the thermometer tubes, the limb F being provided with a float D making contact with the liquid, while the rod F does not make contact with the liquid under ordinary conditions. If the temperature changes suddenly, the liquid in the sensitive thermometer A rises quickly and completes the circuit. If the temperature rises slowly, the liquids in the two thermometers ascend at the same rate, and the circuit is not completed until after the bent rod has been brought into contact with an adjustable stop M, which can be moved to cause the alarm to be given at any temperature. In a modification, two thermometers of similar construction to the thermometer B are used. In another form, compound metallic bars, composed of metals of unequal expansion, are used in place of the liquid thermometers. A further arrangement comprises a liquid thermometer, such as A, combined with a compound metallic bar.

FIG. 1.



3383. Lewthwaite, J. Nov. 7. *Drawings to Specification.*

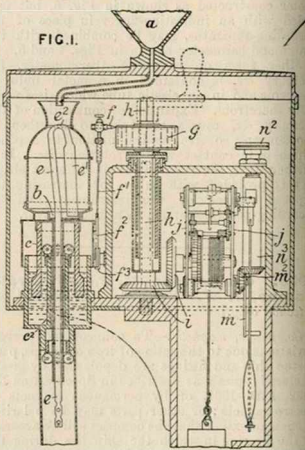
Tripod stands for apparatus for boring and working in rock, stone, or earth. The legs are connected together by a bolt at the top, and one leg is constructed like a ladder and carries a winch the rope of which passes over a pulley at the top and supports the tool spindle and the hanging links which carry it. The legs are braced together by tie-rods, one tie-rod supporting a drum on which the supporting-links for the tool may be wound.

3429. Lewthwaite, J. Nov. 11. [*Provisional protection only.*]

Mathematical drawing-instruments.—In a machine for shaping sweeps and patterns used in mechanical drawing, a pattern or cam is employed, revolving on an axis and guiding the articles to the cutters, which are driven by power. The pressure against the cutters is produced by weights or springs, so arranged that the cutters work only with the grain and cease to cut when they reach the cross grain. In some cases one cutter only is employed.

3464. Beckley, R., and **Hicks, J. J.** Nov. 14.

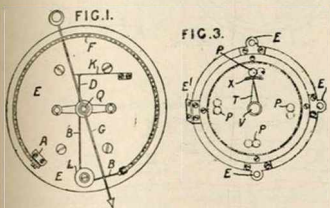
FIG. 1.



Specific-gravity estimating-apparatus.—The apparatus described below for measuring the flow of liquids may be used to determine the strength or specific gravity of liquor run from stills &c. The liquid is received in a vessel *a*, whence it flows through a pipe into a measuring-chamber *b*, which rests upon a float *c* in a vessel containing mercury. The float is preferably made of Derbyshire spar, and carries a hood to exclude foreign substances. It is fitted with a tube c^2, which

works between guide-rollers. A siphon has its short leg e^1 terminating near the bottom of a well b^1 in the measuring-chamber, while its long leg e passes down through the tube c^2. The bend e^2 is flattened so that the discharge level may remain practically constant. To the float hood is attached a bar f^2 carrying a spring f^1, which supports a pencil or marker f by which the movements of the chamber b are recorded on a drum g, preferably made of ground glass and rotated by clockwork. The specific gravity, and therefore the strength of liquor, is estimated by the immersion of the float when the chamber b is full. When this only is to be recorded, the siphon may be replaced by an open pipe similar in position to the leg e, but of larger diameter than the pipe delivering liquor to the chamber.

3489. Bonneville, H. A., [*Malacrida, J.,* and *Boudet, P.*]. Nov. 17.



Weather indicators.—The instrument foretells the weather a day in advance, and also indicates the points of frost and thaw, and direction of the wind. Two curved strips F, Fig. 1, of different kinds of wood are fixed together, and secured at one end A to a metal plate E. The other end is attached to a silk thread B passing over a pulley L to a pulley on the axis Q of the index G. The index is brought back to its original position by a spring K fixed to the plate E, and having a cord D passing over another groove in the pulley on the axis Q. The action of the moisture on the strips causes the index to move over the dial of the instrument and foretell the state of the weather &c. The instrument is placed in a wooden or metallic box, which has at its back ears E and a hinge E^1, Fig. 3, so that the box can be fixed on a support, and access be had to the back, to regulate the size of the openings P for admitting air. This is done by moving over the scale X the pointer T, which on its axis V carries a plate with holes in it corresponding to the holes P. Several other modifications, with various indicating-devices such as a rack and pinion, wheelwork, &c., are shown on the drawings. In one modification, when a metal enclosing-box is used, a piece of charcoal is attached to the end of the strips F to absorb moisture. Several forms of apparatus for demonstrating the theory of the instruments are also shown in the drawings.

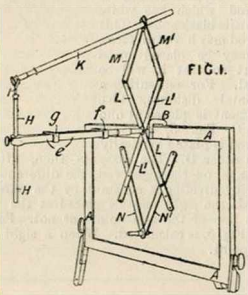
3576. Solomons, B. Nov. 24. [*Provisional protection only.*]

Barometers, hygrometers, thermometers, and weather indicators are combined to form meteorological indicators, especially for use in mines and for taking mountain observations. On a frame are attached a barometer, a reference thermometer with vernier scale, a self-registering thermometer, a hygrometer, and a camphor glass, provided with references for indicating the state of the weather.

3678. Pugh, W., and **Field, J.** Dec. 3. [*Provisional protection only.*]

Spectacles.—Relates to cataract and other lenses for defective vision. Two glasses are fixed together; for a tinted lens, a shell of tinted glass is cemented and curved on one side of the lens, into which is fixed the second lens. An equal tint is thus maintained throughout, of whatever focus is the lens.

3682. Chadburn, C. H. Dec. 3.

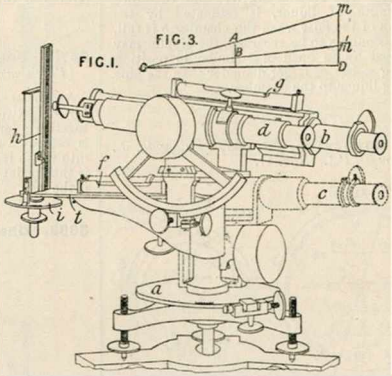


Pantographs.—Relates to apparatus for drawing or sketching direct from natural objects, stated to be applicable also as a pantograph. The instrument is secured by a clamp B to a drawing-board A, which is supported in an almost vertical position on a stand or easel. Cross-levers L, L^1 work on an axis projecting horizontally from the clamp B, and are jointed, as shown, to links M, M^1 and N, N^1. Secured to the horizontal axis is a cap nut to which is secured an arm upon which a slide e works, held in place by straps f and g, to lengthen or shorten the arm. A rod H is adjustable vertically in the end of the slide bar e, and carries a crutch I, to the jaws of which is pivoted a ring K to carry the end of a telescope the outer end of which is carried in gimbal rings on the end of the links M, M^1. The telescope is fitted with a point, cross-hair, or other sight. In using the instrument, the telescope is moved so as to cause the point &c. to travel over the outlines of the object to be drawn, thus causing

the pencil or other tracer carried on the links N, N¹ to move similarly upon the paper &c. *a*. The telescope may be replaced by a plain tube, or it may be dispensed with, the sights being carried on the top of the standard H and links M, N. When applied as a pantograph, a guiding-pointer is used, and the cross-levers are mounted on a vertical axis.

3759. Bonneville, H. A., [*Eckhold, C. A. C.*]. Dec. 10.

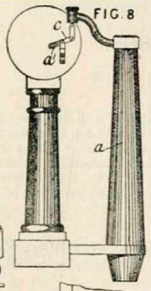
Theodolites; telemeters; surveying-instruments.—Relates to apparatus for measuring distances, angles, and altitudes. The apparatus consists of a graduated circle *a* with vernier which supports a glass *b* moving in a vertical plane, and carrying a level *g*, a glass *c*, and a microscope *d* connected with the glass *b*. At the end of the rule *t* of determinable length, on which is a level *f*, is a vertical scale *h* with micrometer screw *i*. A sight rod of certain length is provided which has white lines on its black ends. This sight rod may have two faces, and may be placed on a support so that it will be vertical. For measuring a horizontal distance, the instrument is placed at one point O, Fig. 3, and the sight rod is placed vertically at the other D. The glass is then, after adjusting the instrument, pointed in turn to the white lines *m*, *m*¹ on the sight rod, the difference of the readings A, B being noted on the vertical scale *h*, when, by dividing a constant by the difference in the readings, the distance O D is given. By other methods the sight may be placed at the two points in turn and sighted by the instrument, placed in the line of the two points or not. For levelling and measuring inclined planes, the length of *m*¹ D, Fig. 3, is calculated. When a sight rod cannot be used, both glasses *c* and *b* are pointed at the same point.

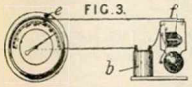


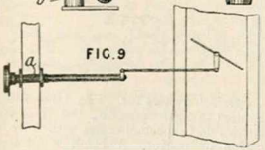
3771. Bailey, W. H. Dec. 11.

Pyrometers.—Relates to numerous improvements in or relating to pyrometers. (1) To enable pyrometers to be adjusted to compensate for permanent expansion, the case which carries the dial is screwed on to the end of the tube or rod and is provided with a slot through which passes a fixing set-screw. The slot is long enough to allow the case to be screwed up for obtaining adjustment. The mechanism which actuates the index-finger may be similarly adjusted. (2) A pyrometer may be arranged to ring a bell when the temperature rises to a certain height. The axis of the metal index-finger is connected to one pole of a battery *b*, Fig. 3, while an adjustable metal stop *e* is connected to the other pole, an electric bell *f* being placed in circuit with the battery. When the finger makes contact with the stop *e*, the circuit is completed, and the bell is rung. The electric bell may be replaced by a mechanically-operated bell, set in operation by an electromagnet which releases a detent. (3) The number of times a certain temperature has been reached may be registered by operating a counting-apparatus by means of an electromagnet placed in the circuit. (4) "Blind "dials" graduated with signs, instead of in the ordinary manner, may be applied to pyrometers for use in connection with secret processes. Dials for pyrometers for indicating very high temperatures are specially graduated. The point to which the hand is moved by subjecting the pyrometer to a certain temperature for thirty seconds, is marked as indicating that temperature. (5) Pyrometers for indicating the temperature of acids are formed of an outer tube of porcelain or other acid-resisting substance and an inner rod of metal. For pyrometers for indicating the temperature of molten tin and lead, the outer tube is preferably made of cast iron. (6) To facilitate the adjustment of the

lever which actuates the quadrant in a "Wood's "pyrometer" described in Specification No. 3101, A.D. 1866, the lever *c*, Fig. 8, is slotted and provided with a set-screw a^1 so that the position of its fulcrum may be varied. The pyrometer tube *a* is enclosed by some non-conducting material to prevent cooling. (7) A pyrometer may be arranged to act upon a damper in such a manner that the damper is opened or closed at a certain temperature. Fig. 9 shows one



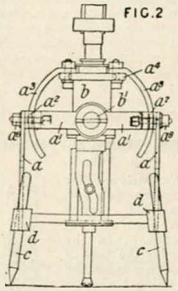




arrangement, in which a pyrometer *a* is connected by a rod to a pivoted damper. In another arrangement, the pyrometer is connected by a rod and bell crank to a sliding damper. (8) To indicate the temperature of the air in the blast pipe, the blast pipe itself is arranged as the expansion tube of a "Wood's pyrometer" shown in Fig. 8.

3876. Lake, W. R., [*McKean, J.*] Dec. 21.

Stands.—Relates to supports for percussive rock drills employed for cutting and working rocks and other hard to substances, and to an improvement on the invention described in Specification No. 1183, A.D. 1868. The wrought-iron or other metal side frames *a* are secured together by bolts, and are supported on pointed metal bars *c*, which pass through sockets *d* and are held by screws.



The cross-plate a^1 is formed with elbow pieces a^2, and through the ends of these pass bolts a^5 which also enter radial slots formed in the side frames *a*, allowing it to be secured at any inclination. The trunnion b^1 on the cylinder *b* fits in a boss in the plate a^1, and the radial arms a^3 attached to the cylinder cover a^4 slide in slots in the elbow pieces a^2, allowing them to take up different positions, in which they are held by bolts passing through them. In a modification, the cylinder is connected by the trunnion to a carriage which fits on a hollow column, and a pinion and rack enable the carriage to be raised or lowered, a ratchet-wheel and pawl locking it in position. The column can be set at any inclination by means of a hinged foot, and is secured by an adjusting-screw at the top, the nut of which rests on an india-rubber buffer.

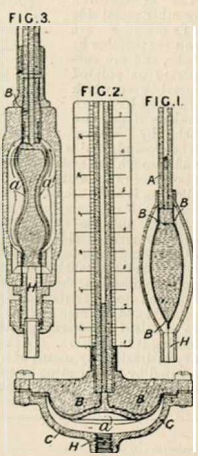
3880. Massey, J. E. Dec. 21. [*Provisional protection only.*]

Sounding-apparatus.—The line is attached to a metal frame of the shape of an oblong shield, at the lower end of which is the sinking weight, and in the upper part is a hollow chamber containing the registering-apparatus. This chamber is covered by a metal plate, on which is a raised box with a sliding cover containing the registering dial and indices. In the lower part of the frame a rotator, consisting of a tube with vanes placed obliquely, is mounted on a spindle carried in bearings fixed in the bottom part of the frame and in the chamber respectively. At the top of the spindle is an endless screw, which by means of gearing moves the indices over the dial. A ring is provided to protect the rotator. Above the rotator is a locking-piece, which is raised, when the apparatus is lowered, by the resistance of the water, but when the bottom is reached it falls between the vanes.

A.D. 1869.

388. Hunt, B., [*Mignon, J. B. J.*, and *Rouart, S. H.*]. Feb. 8.

Barometers.—The pressure gauges described below may be used as barometers by closing the tops of the glass tubes and forming a vacuum therein. The tube H is open to the atmosphere. Two flexible metallic or other membranes B, B, Fig. 1, are joined together and connected to a glass tube A. The space between the membranes is filled with liquid, preferably mercury. As the pressure on the diaphragms varies, the liquid rises and falls in the tube. In another form, a single membrane *a*, Fig. 2, is secured by its edges between rings of india-rubber pressed between the parts B and C of the casing. In a modification, shown in Fig. 3, two membranes *a*, a^1 are used with a block B between them.



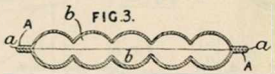
681. Ross, T. March 6. [*Provisional protection only.*]

Magic-lanterns, zoetropic slides for. Two discs are used, one of glass with the pictures formed on it, and the other opaque with radial slits. They are made to revolve in opposite directions.

745. Clapp, W. H. March 11. *Drawings to Specification.*

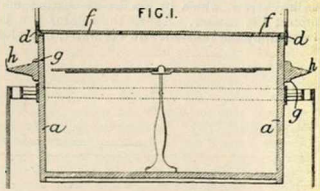
Magic-lanterns; chromatropes.—A lamp-signalling apparatus is stated to be applicable for throwing, upon a wall &c., the shadows of amusing figures painted on a glazed screen of the lantern. The glazed screen and a screen such as is used in a dark lantern are rotated rapidly at the same time, producing the appearance in shadow of a figure performing a series of gestures.

750. Newton, W. E., [*Wheatcroft, H. B., Guernsey, S. B.*, and *Terrell, F. J.*]. March 11.



Spectacles, cases for. Fig. 3 shows the invention applied to cigar cases &c., but it is stated to be applicable to spectacle cases with only one corrugation or pocket. A blank is formed out of a sheet of metal, pasteboard, or other material by stamping, being cut to the required shape, hollowed out, and corrugated all in one operation, so that, when the blank is folded along the line *a–a*, pockets *b* are formed to receive the cigars &c. The folding of the blank forms a spring hinge for the two halves A of the case, and a suitable fastening may be applied and the case lined if desired. If the case is made of paper, it is advisable to form the blank out of two or more layers cemented one on the other by glue or like material, which is made to saturate the paper. Before the glue is dry, the blank is pressed into the required shape in hot moulds, and the glue allowed to set.

770. Labadie, L. March 12.



Compasses, magnetic.—Comprises a system or arrangement for compensating deviation due to

local attraction in iron ships. The bowl *a*, in which the needle is supported and enclosed, is cylindrical, and is made of some magnetic metal, such as iron, nickel, &c. Around the bowl may be placed an adjustable ring *g* of iron, which is provided with a number of radial spikes *h*. The glass cover *f* is fitted in a copper ring *d*.

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934. Girdlestone, J. W. March 27.
Drawings to Specification.

Compasses, magnetic.—Relates to a method of treating iron, steel, or composite ships to prevent compass deviations, and consists, according to one method, in polarizing, on a regulated system, the deck beams of the vessel, and in converting such deck beams either into simple magnets, or into compound magnets having a central pole and two end opposite poles. The errors are detected by comparing the times of vibration of a dipping needle in a plane at right-angles to the meridian on board the vessel and on shore. The deck beams are polarized as required to correct such errors according to several rules which are fully laid down in the Specification. The Provisional Specification also describes a method by which deviations may be prevented by introducing into the deck one or two concentric rings or segments of rings having their centre immediately beneath that of the compass; also another method in which a system of polarization is combined with depolarization. Either permanent magnets or electromagnets are employed in polarizing the deck beams. Reference is made in the Provisional Specification to Specification No. 2592, A.D. 1867.

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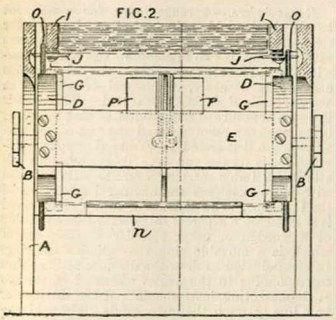
944. Clark, A., [*Adams, J. F.*]. March 29.

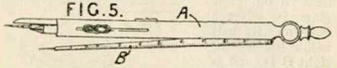
FIG. 2.



Stereoscopes are constructed with an arrangement of permanent magnets to receive and hold the pictures in the proper position for being viewed. The pictures are bound with iron, and are placed in a pack at the top of the case. The pictures are carried upon the ends D of a drum E mounted to rotate in a frame A. When the drum is turned by means of the hand-wheels or cranks B, a picture is caught by the uppermost magnets and carried in front of the lenses P. The pictures are detached by a fixed plate *n*, which slides the pictures from the faces of the magnets and causes them to drop into a lower box. The pictures are supported by turn-buttons J carried by slides I. These turn-buttons are operated, to release the pictures one by one, by means of wires O fixed to the ends of the drum.

1168. Clark, A. M., [*Gedalge, J. E.*, and *Venier, L.*]. April 15. [*Provisional protection only.*]

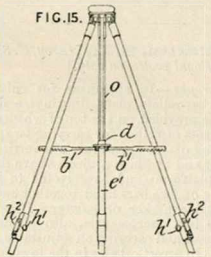
FIG. 5.



Compasses, drawing; scales.—An ordinary pen nib is fitted to the leg of the compasses instead of the usual screw nib. In the case of beam compasses, one of the legs may consist of a holder with a pen at one end and a pencil at the other, and the beam is graduated to serve as a rule or scale. Fig. 5 shows a combined pen and pencil case A fitted with a compass leg B graduated to serve as a scale; a knife blade is also fitted to the holder.

1312. Isaac, L. April 28.

FIG. 15.



Tripod stands.—Stands for telescopes, theodolites, &c. are constructed with a collar *d* sliding on a central rod *o* and carrying hinged tie-rods b^1 formed with racks to engage pins on the legs e^1. The legs are jointed at h^1, and the two parts are held in position by plates h^2 pivoted to the upper parts of the legs and formed with slots to engage pins fixed in the lower parts of the legs.

1334. Bigot, R. F. April 30. [*Provisional protection only.*]

Levels; surveying - instruments; angle - measuring instruments. — Relates to apparatus for levelling, tracing curves, and setting inclines for railroads &c. A plane mirror A, B is suspended from an angle - shaped rod fixed to a sliding collar M on a vertical graduated rod, supported on a tripod. The glass is silvered only on the half below the line of sight C D, and is prevented from oscillating by a fork piece N; wires may be placed in front of the line of sight. The difference of level between this apparatus and a levelling-staff placed at another point can at once be determined by moving the collar M until the pupil of the eye and the sight line on the levelling-staff are seen on the line C, D. Fig. 4 shows an apparatus which may be fixed on the foot or stock of the level, and serve to measure inclines or elevations. A spirit level is combined with the apparatus.

FIG.1.

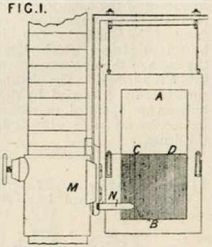
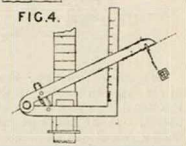


FIG.4.



1390. Newton, H. E., [*Leroy, E. S.*]. May 6. [*Provisional protection only.*]

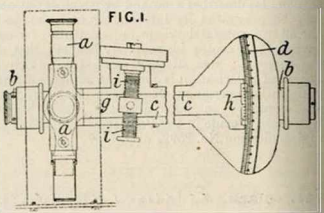
Pantographs.—In apparatus for enlarging and reducing bas-reliefs, plans, drawings, and writings, a frame is provided, on the top of which are guides for four sets of rollers for carrying two platforms. At one end of the apparatus is a vertical spindle, the upper end of which projects above the level of the two platforms and has pivoted to it an arm consisting of two bars fixed together and carrying an adjustable marker or pointer. Between these two bars is a shorter arm, also pivoted to the spindle head and carrying an adjustable marker or pointer. In a vertical slot in the lower end of the spindle is a short connecting-rod, to the end of which a "motor wheel" is pivoted by a ball-and-socket joint. On the motor-wheel is a pin, adjustable in length, engaging with the spokes of a lantern-wheel on a vertical shaft. On this shaft is a wheel gearing with a wheel on another vertical shaft, these two shafts being under the centres of the two platforms. On the top of each shaft is a disc with pins which engage with transverse grooves on the under side of the platforms. By these means the platforms are made to move backwards or forwards. To enlarge a bas-relief, the model is placed on the platform nearest the centre of motion, and the marker or pointer for the original is furnished with an antifriction wheel which will move over the surface. The corresponding tool for operating on the plastic &c. material carries a scoop. For drawings &c., electrical means may be used; for this purpose the paper, which is chemically prepared, is placed on a non-conducting surface.

1495. Wilkinson, W., and **Boss, M.** May 15. *Drawings to Specification.*

Reflectors.—Metal plates, enamelled and lustred, are employed as reflectors for natural or artificial light. The plates are prepared for receiving the enamel by roughening, corrugating, or indenting the surfaces by cutting, rolling, or hammering them. The enamel fills up the hollows, and adheres firmly to the surface. The plates are then lustred by brushing them over with a liquid containing oxide of gold or platinum &c.

1566. Nolan, J. P. May 20.

FIG.1.



Range-finders.—A range-finder for attachment to guns in the field, or in batteries, ships, or other structures, consists of a pair of angle measurers each made up of two telescopes *a* and *b*, with cross-wires, placed across each other. The telescope *b* is enclosed in a case *c*, at one end of which is an angular scale *d* decimally divided. This case is in two places turned truly round, so that the whole instrument can revolve round the axis of the telescope when it is rested in V-shaped supports provided for it on the gun &c. To the telescope *a* is attached a limb *g* carrying a vernier scale *h* to read with more exactness the angular displacement of the telescope. The distance of the object observed is read off on a separate calculating-rule consisting of a wooden or other cylinder at each end of which is a movable ring, the cylinder and rings being graduated to show the distance of the object corresponding to the angles measured by the two angle-measuring instruments and the distance or base line between the instruments. For field purposes, the instruments are fitted on V-shaped supports attached to each of a pair of field guns. One of the supports is made so that it fits into the socket of a tangent' sight, and the other is fixed about fourteen inches in front. When there is no

traversing-arrangement with the gun, the rear support is capable of sliding from right to left in a dovetailed slide. The limb *g* of the telescope *a* is moved by a tangent-screw *i*. For permanent batteries or on board ship, the supports are fixed permanently; the scale *d* is lengthened and more finely divided; the limb *g* of the telescope *a* is moved by a rack and pinion or by a worm by means of an electromagnet so that the limbs of both instruments can be moved and stopped simultaneously. An additional scale, proportioned to the logarithms of the sines of angles, may be made on the calculating-rule; also a scale to show the length of time fuzes to correspond with the range. A measuring-tape for finding the distance between the two instruments may be employed with the apparatus.

1587. Davis, J. H. May 22. [*Provisional protection only.*]

Compasses, magnetic.—In order to indicate any deviation of the needle, due to the change of the magnetic state of the ship, the compass bowl is oval in form and contains two floats, floating on liquid and kept in place by pivots; or pivots alone may be used. The two floats are geared together by means of teeth, so that they will move in opposite directions, and on one are the needles, over which a card is mounted on the float so as to point true north at the place where the instrument is adjusted. On the other float is another card mounted in a similar manner. The ends of the bowls are circular, and are graduated.

1605. Jones, W., and **Sheffield, T.** May 25. [*Provisional protection only.*]

Straight-edges; rulers; curves, reproducing; ruling pens.—To enable straight or curved lines to be drawn for the ornamentation of rooms and for other purposes, without smearing the edge of the straight-edge or curved ruler employed to guide the brush, pencil, crayon, or other instrument, a groove is made in the straight-edge or ruler parallel to the edge, and a finger on the handle of the brush or on the pencil &c. works in the groove. The brush &c. is thus kept out of contact with the edge of the ruler.

1620. Field, J. J. May 26. [*Provisional protection only.*]

Polarizers; microscopes.—The polarizer, which is fitted below the stage of the microscope, consists of a frame with a Nicol's prism, or other polarizer, in the lower part, and a number of selenite plates in the upper. The selenite plates are placed in revolving cells of different diameters which gear at their edges with toothed wheels arranged on a pillar, so that the cells will rotate with different velocities. The piece carrying the polarizer is similarly made to revolve. The selenite frames are graduated and read with indices; the selenite plates may also be turned in their cells so that their depolarizing-axes may be placed in any position; the polarizer may also be movable in the same way.

1883. Holmes, S. June 19.

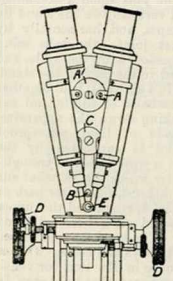


FIG. 1.

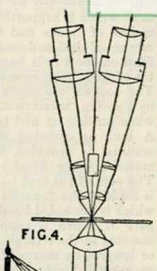


FIG. 4.

Microscopes.—This instrument is so constructed that it may be converted into either a binocular or a monocular, the general arrangement being shown in Fig. 4. The objectives in each half of the tube carry lenses so cut away that the two may come together to form one lens. The two halves of the tube are supported on bars centered at E in the plane of the object, and are moved by levers A, pivoted to the upper milled head A^1. The parts of the tube are made to slide on the said bars by the milled head B, so as to bring the centre of motion of the two bars in the plane of the object. The milled head C gives a separate motion to each half, for the purpose of bringing both into the same focus. The focussing is effected by moving the stage by the milled heads D, or the body of the instrument may be made movable. The whole apparatus may be tilted on trunnions through which runs a pinion actuated by the milled heads D. An illuminating-lens of large angular aperture is arranged below the stage between the usual mirror and the object. Or a prismatic illuminator may be used consisting of a rectangular or triangular prism of glass, which is plane or convex on the incident surface, and has its reflecting-surface with two planes at the binocular angle, the emergent surface being plane. The convex surface is placed with its focus at the source of light, when the two reflecting-surfaces reflect light into the two halves of the instrument. To prevent false light, a stop is placed between the two halves of the object glass, and between the halves of the tube.

1913. Munns, H. T. June 22. [*Provisional protection only.*]

Camera obscuras for sketching purposes. Adjustably mounted at the top of a tripod stand is a box to which is hinged a lens the mount of which is adjustable for focussing by means of a screw in

the box. A mirror is adjustably mounted above the lens, and the landscape thus reflected to the lens is delineated by the lens upon a sketching-table which is supported vertically on the stand by means of hooks and tapes, and horizontally by means of ball-and-socket joints, the balls being fixed on short rods connected with the table, and the sockets being inserted in the legs of the stand. The sockets are made in two parts, held together by a spring, to allow the balls to slip in and out when putting up and taking down the apparatus. A tent or covering made of light waterproof material is provided, and is supported by the material being fitted in a groove in the triangle. The part of the tent under which the sketcher sits is made in the form of a hood, the lower part of which is distended by steel springs, and the upper part of which is supported on a horizontal rod inserted in the triangle. The hood may be raised or lowered by means of pulleys and cords. One or more small hoods are made in the tent for ventilation, and a tube is so arranged that light may be admitted to the sketching-table when required. When it is required to pack the tent, the rod supporting the hood is removed, and the hood collapses and may be packed within the tripod. A board is arranged to slide in and out under the table to exclude bottom light.

2056. Berthon, C. S. July 8. [*Provisional protection only.*]

Squares; circles, centres of, determining.—Relates to squares for finding the centres of circles, and for marking regular or irregular figures in circles. The instrument consists of a T or other square, with two pins on the stock at equal distances on each side of the edge of the square, so that, when the studs are applied to the circumference of a circle, the edge of the square will be along the diameter. A graduated blade is pivoted to the stock or other part of the square for measuring and marking lines in circles.

2073. Clark, A. M., [*Faltorini, S., Lavry, Marquise de, (née Dainville, L. A. O. de),* and *Petit, L.*]. July 10. [*Provisional protection not allowed.*]

Dials and the like; graduating, systems of.—Relates to a mode or system of dividing or measuring time applicable to chronometers, watches, sun-dials, sextants, compasses, and levelling and other instruments. Certain statements are made respecting the proportion between the diameter, the chord, and the circumference of the circle, and it is proposed to divide the circumference into 384 degrees or parts instead of into 360. The hour is represented by 64 minutes, and each minute by 64 seconds.

2085. Bannehr, J., and **Matthews, H.** July 10. *Drawings to Specification.*

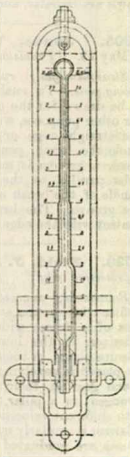
Hygrometers.—In a convenient outlet from a chamber employed for drying bottles, fabrics, and other articles, is fixed an indicator constructed of catgut or other material passing around a pulley and moving a pointer. Moisture is indicated by the motion of the pointer due to the expansion or contraction of the catgut. The apparatus may be used for detecting moisture in bedding.

2271. Miller, J. July 27. [*Provisional protection only.*]

Compasses, magnetic; bearings, instruments for determining.—A slotted base piece or bar, moving about a pin on the cover glass of the compass, carries at one end a vertical slotted bar, the top of which and the centre of the base piece are connected by a cross-bar, forming the hypothenuse of a right-angled triangle. Light from any heavenly body is reflected by the hypothenuse bar through the slot in the base-piece on to the compass card. For taking amplitudes and bearings the opposite end of the base carries a bar which is not vertical. In using this part of the apparatus, the large angle, the small angle, and the object are brought in one, and the hypothenuse of the small angle will show the bearings by reflection on the compass card. Instead of bars, hairs or wires may be used.

2388. Zenger, C. W., Strube, C. L., and **Merlett, L.** Aug. 10.

Anemometers. — The manometer gauge described below may be used as a wind gauge. The tube is made of varying diameters, decreasing upwards inversely as the pressures. It terminates at the top in a globe, and is closed at the bottom by fusion. There are made two capillary openings into a bottom chamber which communicates with a second chamber by a capillary passage. Into this second chamber the gas under pressure is admitted, and acts on the surface of a resisting liquid such as mercury. The capillary passages are always well covered by the liquid, and act as locks to prevent it from rising by jerks under sudden variations of pressure. The manometer shown is graduated to eight atmospheres, and the diameter of the tube varies at every two inches.



The capillary locks prevent the separation of liquid and entrance of gas or vapour to the tube.

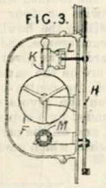
2440. Pinkus, H. Aug. 16. *Drawings to Specification.*

Pyrometers.—In applying "to a blast, cupola, "melting, puddling, reheating, converting or "cementing retort oven" or other furnace "pyro-"metric bars," in accordance with the invention described in Specification No. 2792, A.D. 1867, the bars should be placed in a recess covered by a plate of malleable cast iron protected by a plate of refractory heat-transmitting material, such as zirconia. Thus the bars become heated in proportion to the temperature of the furnace, and "regulate any determined or intermitting or con-"tinuing feed of materials of combustion, as also "to throttle areas of vents of combustion" for manipulating metals in the said furnace.

2587. Isangk, B. Sept. 1.

Barometers.—The indications are recorded by a pencil K upon a strip of paper mounted on or wound round a drum F, driven by an ordinary clock. The pencil carrier is shown as operated by a link from a pressure gauge pointer H, but in the case of mercurial barometers it is connected to a float.

FIG. 3.



2648. Muller, J. A. Sept. 8.

Current meters; logs.—Relates to a meter on the Barker's mill principle, which is operated by a current of air induced by the flow of a liquid along a pipe with a contracted throat. It is stated to be applicable for measuring the velocity of streams, and for use as a ships' log. The liquid to be measured passes through a pipe *a*, Fig. 1, contracted at the middle as shown. A small passage *d* leads to a valve chamber *e* with an india-rubber valve *f*. In an airtight chamber *g* is a tube *h*, perforated at both ends, which forms a turbine. When liquid commences to flow through the contracted pipe, a vacuum is formed in the valve chamber, and the valve is forced down by air which enters through holes a^2, from the turbine chamber. A continuous current of air, which enters by an opening in the casing *y* with baffle-plates c^1, c^2 filled in with cotton, wool, or the like, passes by an opening *i* into the turbine and, escaping through the perforations, causes it to revolve. The air then passes out into the contracted pipe. Attached to the valve are two pins *x*, which, when pressure is formed in the contracted pipe through a stoppage of the current of liquid, are forced up against the turbine and stop it. A very thin plate of glass or the like is placed in the casing, so that, should the air opening be tampered with to exclude the air, the partial vacuum thus formed will break it. The turbine carries a pinion the motion of which is transmitted to a wheel *u* on a spindle *t* carrying a finger *p*. On the finger is a sliding frame controlled by a spring *s*, Fig. 2, which engages in one or more spiral grooves. In its passage the

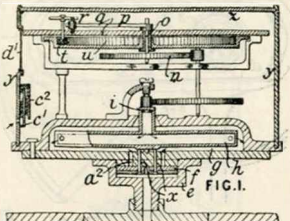


FIG. 1.

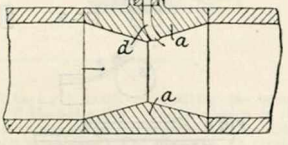
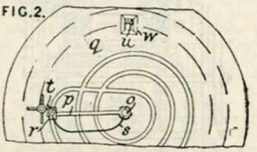


FIG. 2.



block comes against the spokes of a pinion *t* gearing into a wheel *u* carrying an index which is read through an opening *w* in the dial plate *q*. For measuring the velocity of streams, the wheel *u* and the pinion *t* are not required; a catch is provided to hold the rotating parts when not in use. When used as a ships' log, the contracted tube is allowed to project into the water, and is connected by a tube with the indicating-gear.

2690. Allman, H. Sept. 15. [*Provisional protection only.*]

Compasses, magnetic, are constructed so as to correct local attraction. The needle is pivoted near one end, which end carries on a brass prolongation a pivot for a second needle. This second needle has a pin entering a slot in the compass card pivoted on the central pivot. Any local action will cause the two needles to tend to move the card in opposite directions, so that it will not be affected.

2705. Johnson, J. H., [*Arson, L. F. A.*]. Sept. 16.

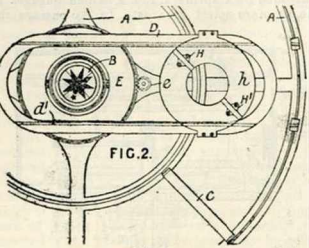


FIG. 2.

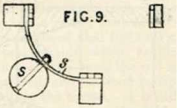


FIG. 9.

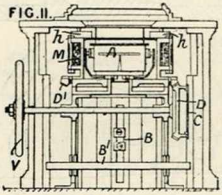


FIG. 11.

Compasses, magnetic.—Relates to apparatus for correcting the deviation of compasses and dipping needles on iron ships &c. The action of masses of soft iron is counterbalanced by iron wire gauze coiled round an adjustable oblong bobbin D, Fig. 2, or plates may be arranged at the sides of this bobbin. The bobbin slides in a shoe d^1 on a toothed wheel E, which gears with a pinion *e* rotated by means of a handle. The apparatus is supported on a frame A, in the centre of which is the compass B. The bobbin is adjusted so that the compass is in the same relative position within it that the compass is in the ship. To correct the influences of permanent magnetism, magnets are enclosed in boxes *c*, which slide for adjustment between the two circles of the frame A; two of these magnets are arranged opposite to each other to neutralize the free magnetic action which each exerts independently of its permanent action. To neutralize the fixed polarization of the soft iron on the compensating-bobbin, permanent magnets are enclosed in boxes H, H^1, arranged on a piece *h* sliding for adjustment on the bobbin D. The action of soft iron is also counterbalanced by a sphere of soft iron S, Fig. 9, horizontally adjustable in a slot in an arc *s*, which arc is also vertically adjustable on any two of the four vertical posts placed round the needle. Fig. 11 shows the complete apparatus. Permanent magnets B, B^1 are placed crosswise under the needle A, and are adjustable in vertical slots. The bobbin M with the soft iron gauze is carried on a bevel-wheel D^1 gearing with a pinion D, which is actuated by a wheel V. Permanent magnets *h* are arranged above the needle, and a permanent magnet C is fixed to the pinion D. The wheel D^1 is required to make one revolution, and the pinion D two, while the ship makes one revolution round its centre.

2780. Davis, J. H. Sept. 24. [*Provisional protection only.*]

Compasses, magnetic.—To indicate any change that may take place in the deviation, a ring frame carrying a toothed wheel is mounted in the compass bowl; the toothed wheel gears with a toothed ring, with twice or four times the number of teeth, fixed within the bowl. The ring is graduated at its circumference, and carries a pivot for the compass card. The pivot and the axis of the toothed wheel are on the same diameter, and on different sides of the centre of the ring. To reduce the wear on the pivots of compasses, each pivot is surrounded by a cup containing mercury or other liquid, and on the part resting on the pivot a float is attached which rests on the liquid.

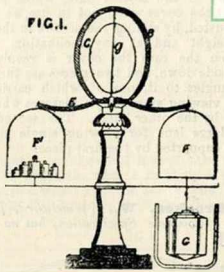
2850. Bonn, J., and **Nitsch, J.** Oct. 1. [*Provisional protection only.*]

Squares; rulers; mathematical drawing-instruments.—Relates to an instrument to be used for ruling lines on paper &c., and is described as applied to an ordinary drawing-square, but it may also be applied to rulers. A slot is cut in one of the arms of the square, and above the slot is placed a box having a slotted cover. Inside the box is a horizontal lever, "one end of which is capable of "working through the slot in the square." One end of this lever is attached by a coiled spring to the cover, and a stud on its upper surface passes through the cover. The other end of the lever is "capable of being acted upon by a hinged or "jointed lever, which passes through the slotted "cover and is furnished with a head by which it "can be depressed." On the square being applied to the surface to be ruled, the head is pressed, whereby the horizontal lever is depressed, "de-"scribing in such operation an arc of a circle, and "the end thereof brought to a point posterior to "that at which it stood in its normal position." By this action the square is moved a given distance from its normal position, the distance being regulated by means of a toothed wheel having a spindle provided with differential cams or ratchet teeth and by the above-mentioned stud. By means of "simple modifications" the instrument can be used for ruling "curved and diverging "or converging lines."

2859. Bodart, A. Oct. 2.

Specific-gravity estimating-apparatus.—Relates to balances for determining the specific gravity of liquids or solids, and also for ordinary weighing. The standard is formed with a ring B having a wire which carries the beam E provided with scale-pans F^1, F suspended by wires A pointer *g* is provided, and a wire H limits the oscillations of the beam. Beneath one pan F is suspended a body G, preferably formed of blown glass, and fitted with a stopper so that, if necessary, ballast may be introduced. When using the apparatus, the balance is first brought to equilibrium by putting weights in the pan F^1; the body G is then immersed in the liquid and weights taken off until equilibrium is restored, when, if the volume of the body be 100 cubic centimetres, the number of grammes taken off will indicate the specific gravity of the liquid. Weights may be placed on the pan F instead of taking them off the pan F^1.

FIG.1.



2973. Smith, J. Oct. 13.

Logs, timing. Relates to an instrument for timing ships' logs, which instrument or time measurer gives an audible signal at a pre-arranged time after a finger key has been depressed. A mainspring *a* actuates, through a train of wheels, an escape-wheel *b* into which an anchor escapement works. This escapement is governed by an arm on its axis which vibrates between adjustable stops to regulate the time of the instrument. The end of a detent lever *g* enters a notch in a snail-wheel *f* which is on the slowest wheel of the train. By depressing the finger key *h* the detent lever is lifted and the wheel train runs. On the axis of the detent lever is a bell hammer *i*, which is raised during the going of the train and is let fall when the detent lever resumes its place in the notch and stops the wheel train. The train may be stopped by a lever g^6 acting on a pin on the escapement-wheel. Fig. 3 shows a modification, in which the depression of the push-piece winds up the spring. The push-piece B acts on a curved arm B^1, the axis of which carries a toothed segment D gearing with a pinion fixed to a stop wheel having a notch for rotating the escape wheel E through a click. The depression of the push-piece also moves the hammer F to the right, where it is held by a pin on an arm M. A pivoted lever L, carrying the hinged arm M, is provided with a pin which engages a hole in the periphery of the balance H. When the finger is removed from the push-piece, the weight of the hammer F acting on the arm M draws the lever L forward and releases the balance H. A pin E^1 raises the arm M to allow the hammer to fall and strike the gong G at the completion of the revolution. The escape-wheel has 28 teeth, and makes a revolution in 14 seconds. The seconds are indicated by a hand on a dial. In another modification, a spring operates a train of wheels controlled by a lever escapement. The spring is wound up by reciprocating a sliding bar which carries a spring pawl engaging a ratchet-wheel. The balance carries a pin which is held by a lever operated by means of the push-piece. One of the wheels of the train carries four pins for operating the hammer which sounds the alarm.

FIG.1.

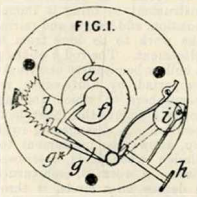
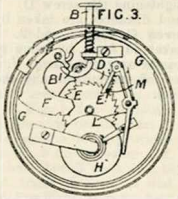


FIG.3.



3043. Henry, M., [*Boutet, T. C.*]. Oct. 19. *Drawings to Specification.*

Sounding-apparatus for rivers. The surveying-vessel carries a long tube terminating in a roller which moves over the river bed. The other end of the tube is swivelled in a cabin at the stern of the vessel, and terminates in two pointers which move over two quadrants, indicating horizontal and vertical angles respectively.

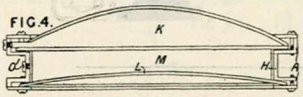
3410. Lockett, G. Nov. 27. [*Provisional protection only.*]

Graphoscopes; stereoscopes.—The base of the instrument forms a case for containing pictures.

The cover of this case is attached by two milled-head screws to two slotted bars, which may be folded over the cover when not in use, so that it can be adjusted, by sliding the screws in the slots, at any height and at any inclination. When raised from the case the cover is revolved or turned upside down, and two pieces are turned up at right-angles to it, one of which carries two lenses for viewing stereoscopic pictures which are supported by the other piece. The second piece carries a large lens for viewing single pictures, which are supported by the first piece.

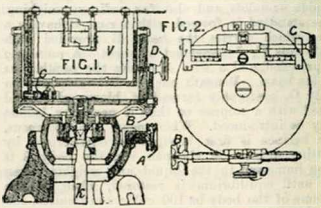
3515. Brookes, W., [*Woodward, D. A.*]. Dec. 4. [*Complete Specification, but no Letters Patent.*]

FIG.4.



Lenses; reflectors.—Relates to the construction of fluid lenses, and of the surfaces for carrying the silver of reflectors. The pieces of glass are bent to any required curvature or form from circular discs, which are placed on moulds of soapstone and then heated, when the glass will conform itself to the mould by reason of its own weight. The shells for lenses so formed are packed in a ring frame A with cement, and the whole secured by a plate screwed on. An opening, which is closed by a screw, is left for introducing any suitable fluid or solution. To provide for the expansion of the fluids in the lenses, one or more air chambers may be formed above the openings for introducing the fluid. Fig. 4 shows an achromatic lens; a curved piece of glass L is cemented and secured in a part H which is a continuation of the ring frame A of the lens K. The space M is filled, through the opening O^1, with a different fluid to that in the lens K, or with a solution of the same substance but of different strength.

3676. Wise, W. L., [*Kukatskay's, Seyss, & Company*]. Dec. 18.



Levels and plumbing-instruments; angle-measuring instruments.—Relates to an instrument for levelling and for measuring angles, which "instru-"ment may be taken to pieces and its various "parts used separately to suit special requirements, "such as for the use of artillery, for scientific "purposes, railway and geometrical surveys, and "so forth." A pendulum is combined with the instrument to bring it immediately into a level position, and gauges and mirrors are used to allow the work to be done from behind without displacement. The rod *k* of the pendulum is fixed to a hollow hemisphere carrying the instrument, and supported by knife-edges in an outer hollow hemisphere to which the legs are attached. A screw A clamps the inner hemisphere in its level position. A disengaging-screw D, when screwed up, allows the instrument to turn on a divided circle; when it is unscrewed, the apparatus is fixed. A worm B, each turn of which represents a degree on a circle, is thrown out of gear by tightening the screw D. Vertical measurements, and distances, are taken by means of a tangential screw C, Figs. 1 and 2. The lines of sight are taken in front, by using gauges in a line which passes over the mirror V, and behind by making use of the mirrors and the gauges in a different line.

A.D. 1870.

126. Reynolds, W. F. Jan. 15.

Logs; sounding-apparatus. — The indicator is fixed, and the bearings are made to adjust themselves to the direction of the tow line, connecting mechanism being arranged between the rotator and the indicator. Behind the dial is a plate *a*, Fig. 3, with a collar *b*, in which is pivoted a hollow globe *c*; inside this globe a second globe *d* is supported on horizontal pivots. Through a prolongation *e* on the inner globe passes a spindle *f* connected to the tow line and to a cup *g*. In the outer globe *c* is a vertical slot so that the spindle *f* can move with the tow line in any direction. The cup *g* rests against friction-wheels, supported on a collar surrounding the cup, and is connected by a universal joint *h* to a spindle *i* carrying the first wheel *ii* in the train actuating the dial C, Fig. 1, for indicating fractions of a mile. On the axis of this dial C is a snail cam *f* which actuates a lever provided with a spring 2 and a catch 5 on its other end. This catch engages a ratchet-wheel 3 on a dial B which indicates miles. A tooth K on this dial engages pins on the dial A which indicates tens of miles. The dials are kept in place by spring stops X. The indicating figures on the dials are seen through apertures formed in a front screen. Rotators for ships' logs and sounding apparatus are each formed of a long cylindrical body provided with diagonal grooves in which the blades are fitted.

FIG. 1.

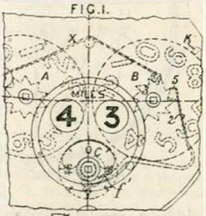
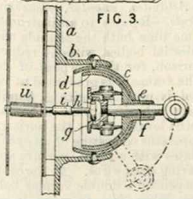


FIG. 3.



293. Gordon, J. E. H. Feb. 1.

Wind vanes.—Consists of apparatus for communicating the movements of a wind vane to a dial instrument by electrical means. On the axle 1, Fig. 1, to which the vane is fixed, is a wheel 3 gearing with a wheel 4 on the axis 8 which carries two discs 5, 5^1. In each of these discs are two grooves, Fig. 2, one, 14, concentric, and the other, 15, eccentric. In the grooves are two slides or valves 16, 17, which move on a pin at one end and at the other have a piece of wire which passes through a curved slot in the bottom of the groove. In one disc the valves are arranged as shown in Fig. 2, and in the other in the reverse way. Thin pieces of brass 6, 6^1, insulated from each other, have their ends bent at right-angles to dip into the grooves in the discs. When the disc 5 revolves in the direction shown by the arrow, the valve 17 causes the point 6 to remain in the inner concentric groove so that it will not be moved. If, however, the disc rotates in the opposite direction, the valve 16 will cause the point 6 to travel in the outer eccentric groove so that the spring 6 will be depressed and make contact with the spring 7, once for each revolution of the disc. When the axis revolves in the opposite direction, contact is made between the contacts 6^1 and 7. A valve 16^d prevents the disc from moving back while the point is in the eccentric groove. A weight 9 on

FIG. 1.

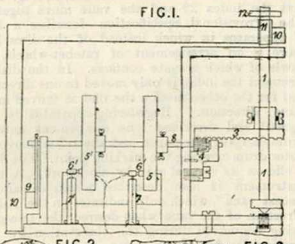


FIG. 2.

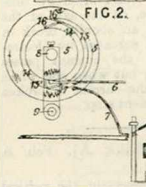
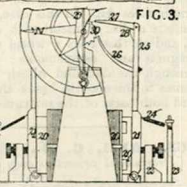


FIG. 3.



the axis 8 prevents the points 6 and 7 from remaining in contact and also carries the point 6 through the valve 17. The axle 1 passes through a tube 11 in the top of a water-tight cover 10 : rain is prevented from entering by a rubber disc 12 on the axle. Fig. 3 shows the dial instrument; the armatures 21 of two electromagnets 20 each carry an escapement arrangement engaging with a separate ratchet-wheel on the axis of the index 29. This escapement consists of two arms 26, 27, the former fixed, and the latter pivoted to the piece 25 on the armature ; a stop 28 prevents the arm 27 from falling. Each armature is drawn back by an adjustable spring 24 on a pillar 23, which may be turned round for adjustment. A screw 22 limits the motion of the armature. The number of teeth on each of the ratchet-wheels 30 is the same as the ratio of the teeth in the wheels 4, 3, Fig. 1, so that the index 29 and the vane move together. The Provisional Specification describes a form of apparatus in which instead of the discs 5, 5^1 there is an arrangement of ratchet-wheels, the pawls of which actuate contacts. In the dial instrument the index is only moved in one direction, and for the other motion the dial is moved in the same direction. Registering-apparatus is also figured and described ; one escapement moves a drum carrying the paper, and the other moves an outer drum carrying the marking point. The drum is slid on its vertical axis by clockwork. A third instrument is also described which is called a "coast vane" which only indicates on the dial the direction of the vane when desired, the two parts being connected during the observation by telegraph wires &c. In this case, on the axle of the vane is a disc of metal with an ebonite break in it, and on this rolls a wheel actuated by electromagnets and escapements ; the current passes through the disc and wheel, but when the wheel comes to the ebonite break the current is broken and both parts of the instrument stop.

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362. Abel, C. D., [*Bodin, J.*]. Feb. 8. [*Provisional protection only.*]

Sounding apparatus.—To ascertain the vertical depth, the angle which the lead line makes with the perpendicular is measured, and then with the length of line the true depth can be found from tables. For this purpose two weighted guide bars are hung by a universal joint &c. so as to hang in a vertical position, and on the pin, on which these bars hang, is suspended an arm, provided with a hook and a graduated arc. When the line is let out, it is attached to the hook, when the graduated arc will be pulled out of its perpendicular position ; its reading is noted after it is fixed to the guides by a set-screw. The lead has a spherical end with cavities containing grease, so that at any inclination of the line a sample is taken from the bottom so that its nature may be ascertained.

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372. Cutting, R. C., and **Mason, A.** Feb. 9. [*Provisional protection only.*]

Compasses, magnetic.—In order to prevent deviation due to local attraction, three or more magnets are arranged horizontally around the needle ; and underneath and parallel to these are arranged other magnets, with their poles in each case in the opposite direction to those of the magnet above.

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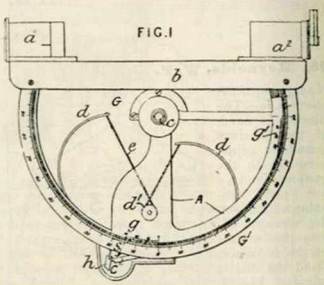
476. Lake, W. R., [*Colby, H.*]. Feb. 17.



Altitudes, angular, measuring ; latitude instruments.—Relates to an instrument for taking at the same time both the altitude and zenith distance of celestial bodies, without reduction to the natural horizon, for the purpose of determining latitude. The frame G is graduated at its edge G^1 as shown, and is provided with a handle at the back, and with a horizon plate *b* beneath which is fitted a spirit level. Above the horizon plate is the sighting apparatus consisting of an eye tube *a* having double plates with a small aperture and the object tube a^2 having cross wires. At the centre C of the frame is suspended a double vernier balance A, so weighted that when free to move it rests with the arrow opposite the zero on the frame. The lower vernier *g* is the altitude vernier, and the upper one g^1 is the zenith vernier. To prevent undue oscillation, a cord *e* attached to springs *d* passes round a pulley d^1 on the vernier balance. The vernier balance can be held in any position by pulling a spring trigger *h* on which rests the end of a pivoted lever *c*. When the lever is released, a spring *s* presses it down, and forces a tooth on its other end into a notch in the rim of the vernier balance.

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520. Clark, A. M., [*Granier, E.*]. Feb. 22. *Drawings to Specification.* [*Provisional protection only.*]

Rulers.—Combination tools, consisting of two limbs jointed together by a rivet or screw and shaped at different parts with cavities, round, flat or raised surfaces, sharp edges, or points in order to form different tools, have the edge of one limb formed straight to act as a ruler.

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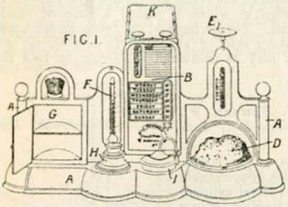
861. Hawksley, T. P. March 24. [*Provisional protection only.*]

Thermometers, clinical. To prevent the possibility of the index of a self-registering maximum thermometer entering the bulb, when the instrument is shaken, the tube is contracted below the scale.

1016. Wight, C. H. April 6.

FIG. 1.



Thermometers.—Relates to a stationery case combined with various articles, including a thermometer. The stand or frame A is made with apertures for containing paper, ink bottles H, I, a sponge D, and a gum bottle. On the stand is mounted a miniature safe G forming a case for stamps, a calendar B, a thermometer F, a letter balance E, and a pen rack K.

1023. Bonneville, H. A., [*Pannetrat, F. M.*]. April 7.

Latitude and longitude instruments; sextants, quadrants, and the like.—Relates to an instrument for determining mid-day or any other time of the day, the latitude, the longitude, and the meridian line. To find the latitude the time must be known, and to find the time the latitude must be known. From the determination of the meridian line any variation of the magnetic compass can be determined, or the compass may be dispensed with. In a box A, Figs. 1 and 13, are two half cylinders which represent the two hemispheres. The box has pivots *b* in side standards *c* to one of which standards (or to both) is fixed an arc B over which moves an index G carried on the pivot *b* of the box. The whole apparatus may be turned round a pivot T, and may be levelled by screw feet. The index G may read on the arc B with a vernier or it may carry an arc *g* against which an index H, pivoted on the index G, reads minutes; in the same way an index L on the index H reads seconds; still further division may be carried on with the use of more indices and arcs. The half cylinders are arranged back to back in the box, Fig. 7, and on the concave surfaces lines are drawn parallel to the axis g^{II} g^{III} in one for times from 6 a.m. to 6 p.m., and in the other for times before 6 a.m. and after 6 p.m. The line M M^1 is for the time of mid-day. The line E E^1 represents the equator, and lines on each side of this represent the sun's declination. In the axes g^{II} g^{III} are threads with a knot which is brought exactly in the line P O P by screws which carry the ends of the thread. A modification is described with only one of the half cylinders. To find the time of mid-day with the instrument, the shadow of the thread g^{II} g^{III} is

FIG. 7.

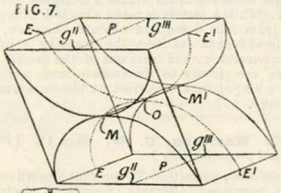
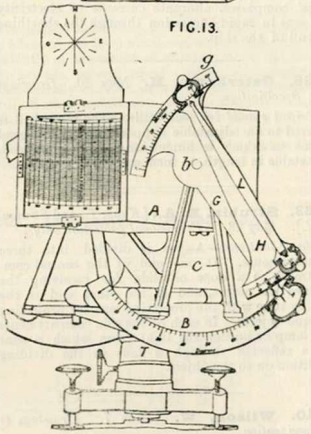


FIG. 13.



brought on the line M M with the knot on the line representing the declination of the sun calculated for the day. When the shadow of the knot is stationary, that is neither ascending nor descending on the line M M, the time of mid-day is reached. The indices will at the same time indicate the latitude of the place; and a board hinged to the box A, and on which the cardinal points are marked will indicate the meridian. For use on board ship the apparatus is placed on a weighted board supported by a number of gimbal rings.

1318. Penny, G. S. May 9. [*Provisional protection only.*]

Stereoscopes; graphoscopes.—In cabinet stereoscopes and other similar apparatus the pictures are shown under a succession of different tints, to represent morning or evening, moonlight effects, &c. The pictures are mounted on an endless band carried on horizontal shafts; and each picture is

lighted in turn by reflection from a horizontal drum on which is a succession of the required tints. The shafts carrying the band are so geared to the drum shaft that it moves through the space of one picture while the drum makes a complete revolution. While a picture is being changed a flap on the drum falls down and obscures the view, and the light is shut out from the drum by a lid on the apparatus worked from one of the shafts. To secure the picture to the endless band, a frame, with a hinged back, is carried on blocks secured to the band.

1347. Harrison, C. W. May 11. [*Provisional protection only.*]

Compasses, magnetic.—To prevent deviations of ships' compasses, alternate currents of electricity are sent in rapid succession through the sheathing or hull of the ship.

1466. Osterkamp, H. May 20. *Drawings to Specification.*

Tripod stands for rock drills. The rock drill is secured to an adjustable support on a two-legged frame to which is hinged another leg or rod, adjustable in length, to form a stand.

1563. Strubin, E. A., [*Kung, T.,* and *Strubin, H.*]. May 28. [*Provisional protection only.*]

Magic-lanterns.—A box is divided into three compartments. At one end of the central compartment is a door or slide for receiving the picture or object, and at the other end is the sliding tube with the projecting lens for projecting opaque objects. In each of the side compartments is a lamp or burner, the light from which is sent by a reflector through a lens in the dividing partition on to the object.

1640. Wilson, W. June 7. *Drawings to Specification.*

Pyrometers.—As described in the Provisional Specification the temperature of a gas-producing retort is regulated by the use of a pyrometer arrangement of mechanism which indicates the degree of expansion of the retort on a dial plate and may be connected to the damper of the furnace flue, which is thus made partially self-acting.

1693. Punshon, R. June 13. [*Letters Patent void for want of Final Specification.*]

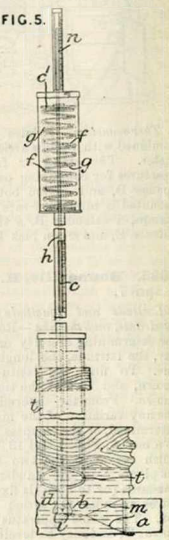
Compasses, magnetic, indicating deviations of, in iron ships &c. On the north pole of the needle is a toothed wheel caused to revolve by gearing with teeth on the bottom of the compass. This wheel is numbered on its face with the points of the compass, one to eight, sixteen, or thirty-two. The deviation of the needle from the north is indicated by the position of the wheel in relation to the end of the needle, after the said wheel has been set with number 1 uppermost or in a vertical line over the end of the needle. The needle is balanced by a second wheel on the south pole.

1694. Henry, M., [*Derogy, E. E. N.*]. June 13. [*Provisional protection only.*]

Spectacles and eyeglasses.—Achromatic lenses are employed. To secure the lenses in their frames, the lenses or the frame are formed with a groove at the edge in which is placed a strip of elastic material. The portions of the frame on the upper and under side of the glass form a spring, or a spring may be combined therewith, to hold the glass.

1797. Jensen, P., [*Julius, F.*]. June 24.

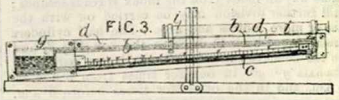
FIG. 5.



Logs; current meters.—A disc, or preferably a short metal cylinder *a*, is connected by bars *m* with a towing chain *b*. This chain is guided by rollers *i* into a tube *d* where it is jointed to a rod *c*, which passes to a case *g* and carries a disc c^1 near the top resting upon a spiral spring *f*. The tube *d* is placed in a tube *t* extending from a ship's bottom to a little above the water line, and the tube may be fitted with a packed piston. At *h h* is a slot with a scale of knots and an index on the rod *c* working over it, the end of the rod *c* passing up within a glass tube *n* also graduated and carrying a second index. The apparatus may be used as a current meter.

1877. Watkin, J. W. S., [*Watkin, H. S.*]. July 2.

FIG. 3.



Range-finders; levels; angle-measuring instruments.—Relates to an instrument called a "hydro-"clinometer" for measuring angles for determining distances, which may also be used for levelling