

A. LELOUP.
DIAL PROTRACTOR.
APPLICATION FILED AUG. 30, 1910.

1,060,466.

Patented Apr. 29, 1913.

Fig. 1.

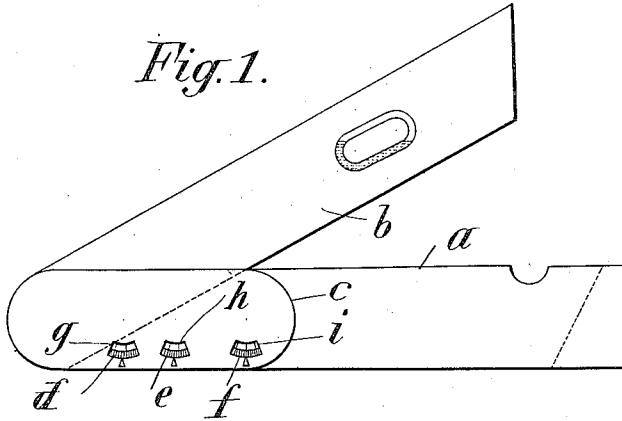


Fig. 2.

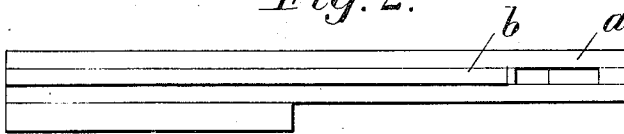


Fig. 3.

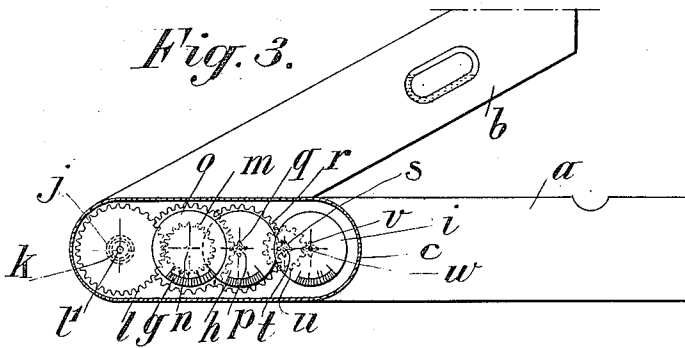


Fig. 4.

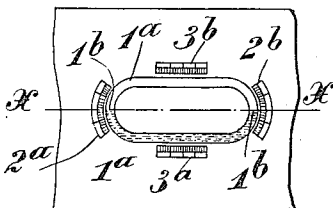
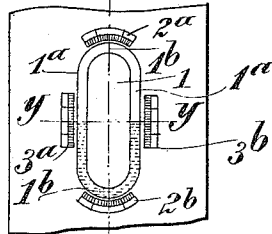


Fig. 5.



Witnesses:

J. P. Dwyer
Chas. C. Munn

Inventor:

By *Auguste Leloup*
Decker & Co. Attorneys

UNITED STATES PATENT OFFICE.

AUGUSTE LELOUP, OF LANGRES, FRANCE.

DIAL-PROTRACTOR.

1,060,466.

Specification of Letters Patent.

Patented Apr. 29, 1913.

Application filed August 30, 1910. Serial No. 579,732.

To all whom it may concern:

Be it known that I, AUGUSTE LELOUP, a citizen of the French Republic, and resident of Langres, France, have invented certain new and useful Improvements in Dial-Protractors, of which the following is a specification.

This invention relates to an instrument allowing of angles being exactly measured and of their value being read on one or more dials indicating the degrees, the minutes and the seconds.

This apparatus is composed mainly of an implement well known under the denomination of bevel protractor on the pivot of which is mounted one of the gear wheels of a toothed gearing contained in a box which is made integral with one of the arms of the bevel protractor. The other arm of the latter when moved actuates the gear wheels through the instrumentality of the pivot and the angles may be read on dials carried by certain gear wheels and which move in front of windows provided in the cover of the box.

The apparatus is utilized absolutely in the same manner as an ordinary bevel protractor, one of the branches or arms of the latter being held in contact with one of the sides of the angle to be measured while the other arm is rotated around the fulcrum or hinge of the two arms until it applies itself to the second side of the angle. The apparatus besides may be provided with a water level of a special construction allowing to determine any desired position with reference to the horizontal or vertical direction.

The accompanying drawing given by way of example, shows one form of embodiment of a dial protractor which forms the subject matter of this invention, and in this drawing: Figure 1 is an elevation view of the apparatus. Fig. 2 is a top plan view of same. Fig. 3 is an elevation view with a partial section. Figs. 4 and 5 are detail views drawn at a somewhat enlarged scale showing the working of the water level.

As shown in the drawings, the apparatus comprises a bevel protractor composed of two arms *a*, *b* hingedly connected together at one of their ends. Secured to the arm *a* is a box *c*, which is provided with windows *d*, *e* (Fig. 1) behind which movable dials *g*, *h*, *i* appear which allow to read in degrees, minutes and seconds the angle formed by the arms *a* and *b*. The dials *g*, *h*, *i* are ac-

tuated in the manner shown by Fig. 3. The arms *a* and *b* are hingedly connected together by means of a tube or pivot member *j* which is secured through the medium of a crown and of screws on the arm *b* and rotates freely in the two branches of the arm or body *a* to both sides of which it is held by any desirable means. This tube *j* carries for instance by means of a pin penetrating into a groove (not shown) a second tube *k* on which a toothed wheel *l* is mounted. This toothed wheel may be secured by means of a cotter pin, for instance on a pivot *l'*, which is made integral with a disk or cap brazed into the tube *k*. The wheel *l* meshes with a pinion *m*, carried by a shaft *n* which equally carries a toothed wheel *o* made integral with the movable dial *g*. The gear wheel *o* meshes with a pinion *p* mounted on a shaft *q* carrying on the other side a toothed wheel *r* which is made integral with the movable dial *h*. The wheel *r* meshes with a pinion *s* carried by a shaft *t* which carries on the other side a toothed wheel *u* which meshes with a pinion *v* which is mounted as well as the movable dial *i* on a shaft *w*. The shafts *n*, *q*, *t*, *w*, are rotatably mounted as well as the shaft *k* into the box or casing *c*.

It is clear that the toothed wheels and pinions cited above must be geared with reference to each other in a certain ratio which varies according to the degree of sensibility which it is desired to give the apparatus. If one admits for instance that the movable dial *g* were to show the degrees, the dial *h* the minutes and the dial *i* the seconds, each subdivision of the dial *g* corresponding to one degree and each subdivision of the dial *h* or of the dial *i* respectively to 6 minutes or to six seconds, it would be possible to give to the toothed wheels the following numbers of teeth: Wheel *l*, 100 teeth. Pinion *m*, 50 teeth. Wheel *o*, 100 teeth. Pinion *p*, 10 teeth. Wheel *r*, 100 teeth. Pinion *s*, 10 teeth. Wheel *u*, 36 teeth. Pinion *v*, 6 teeth. It is needless to say that one might choose as well other numbers of teeth giving the same result.

The dial showing the seconds and even that showing the minutes might be dispensed with, the apparatus then indicating only respectively the degrees and the minutes or only the degrees and being simplified in a corresponding manner.

One of the arms of the apparatus for instance the arm *b* may receive a water level *z*

(Figs. 4 and 5) which is formed of a glass tube bent in elongated shape and closed on itself so as to have two parallel arms 1^a and two ends forming half circles 1^b. The water level is filled to half its height with a liquid which is preferably colored in the fashion used in apparatuses of this kind.

When it is desired to measure an angle with reference to the vertical direction (Fig. 4) the arm *b* is applied against the object the position of which has to be determined, the level *x x* then indicates on the scales 2^a and 2^b which are graduated in opposite directions, the angle comprised between the arm *b* and the vertical line. When it is desired to determine the position of a member with reference to the horizontal line, the function is absolutely the same and the corresponding angle is indicated by the level *y—y* of the same liquid mass by means of the scales 3^a, 3^b which are also graduated in opposite directions.

Having now fully described my said invention, what I claim and desire to secure by Letters Patent is:

A bevel protractor comprising a body composed of spaced plates, an arm movable

into the space between said plates when in inoperative position, a tubular pivot connecting said arm to the body, a casing secured to the side of one of the plates of the body adjacent to the pivot member aforesaid, a second pivot fixedly secured within and to the tubular pivot, said second pivot projecting into the casing, a train of gears rotatably mounted within the casing aforesaid, dials secured to the gearing, the casing having sight openings above said dials to permit reading of the latter there-through, and a controlling gear secured to the end of the pivot projecting into the casing, said gear being adapted to operate the train of gearing aforesaid upon movement of the arm, and a spirit level mounted in the arm and adapted to be received between the sides of the body when in an inoperative position.

In testimony whereof I have hereunto set my hand in presence of two witnesses.

AUGUSTE LELOUP.

Witnesses:

O. H. OLIVIER,
E. TURANE.