No. 842,205. PATENTED JAN. 29, 1907.

P. KELLY.

BEVEL PROTRACTOR.

APPLICATION FILED MAY 14, 1906.

Fig.1.

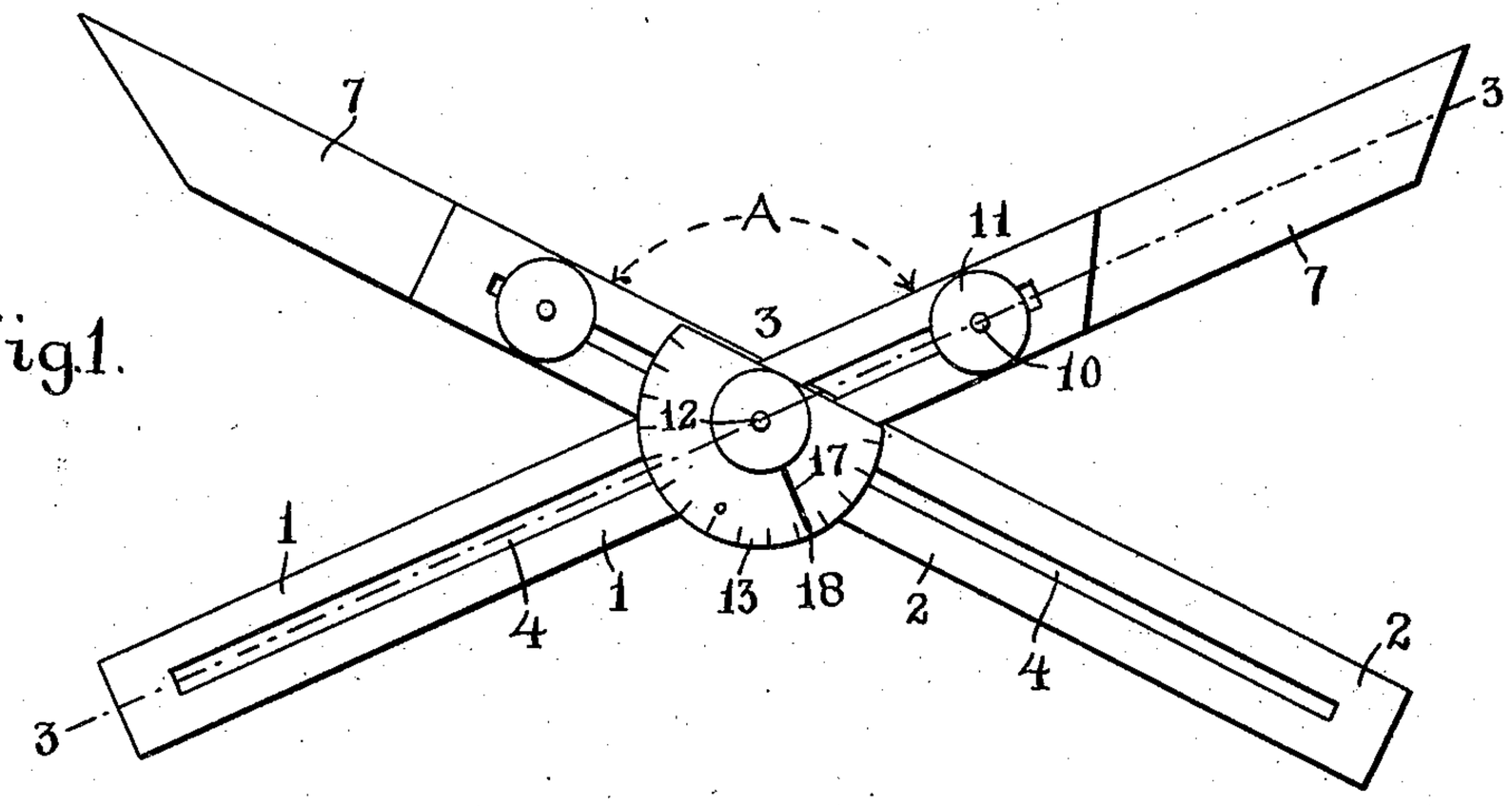


Fig.2.

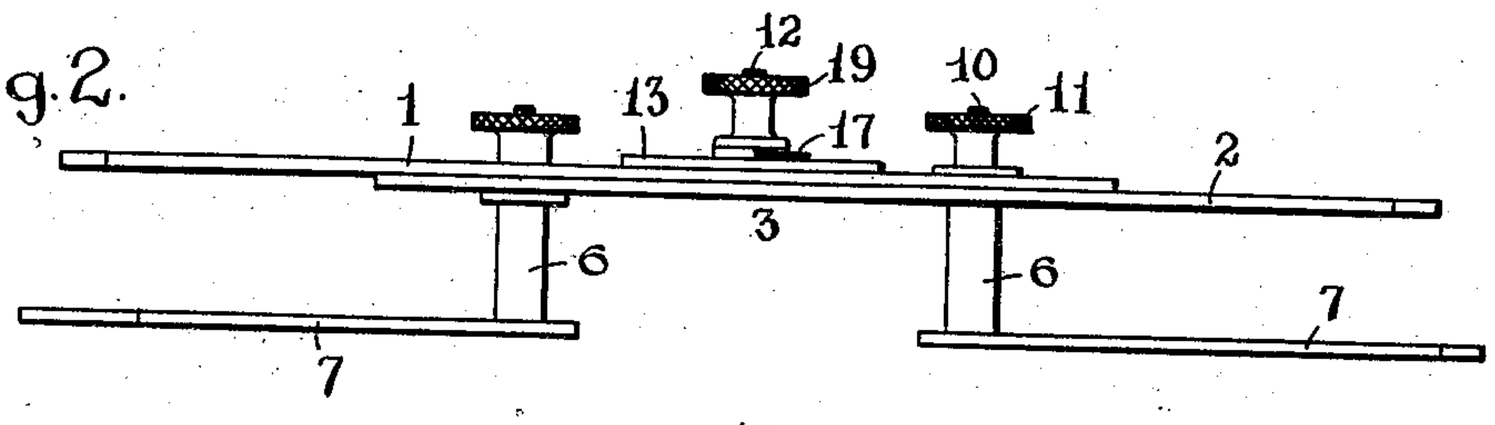


Fig.3.

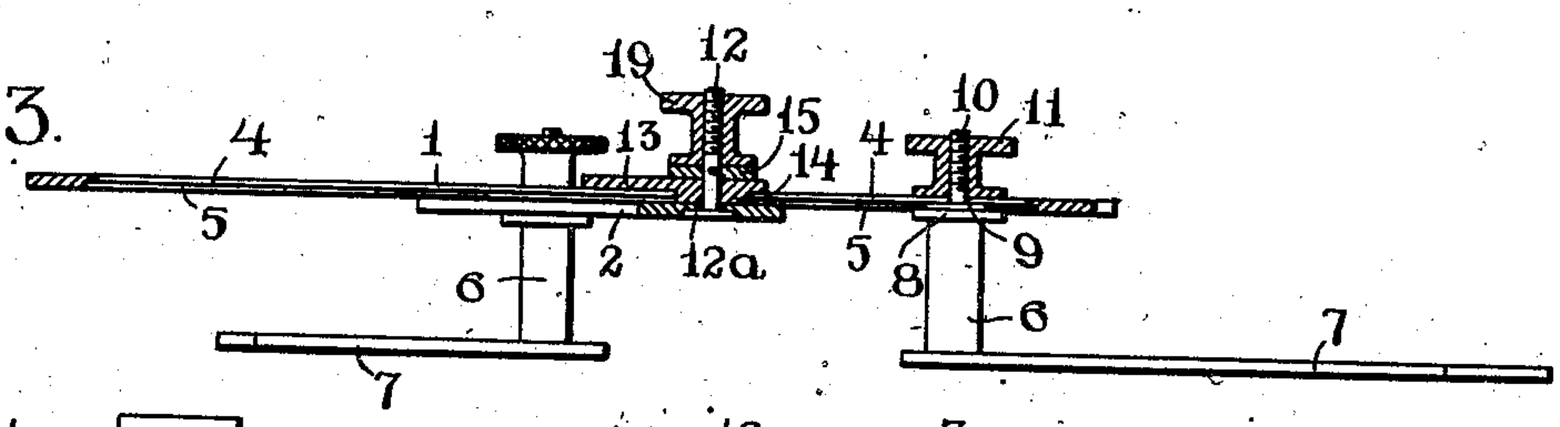
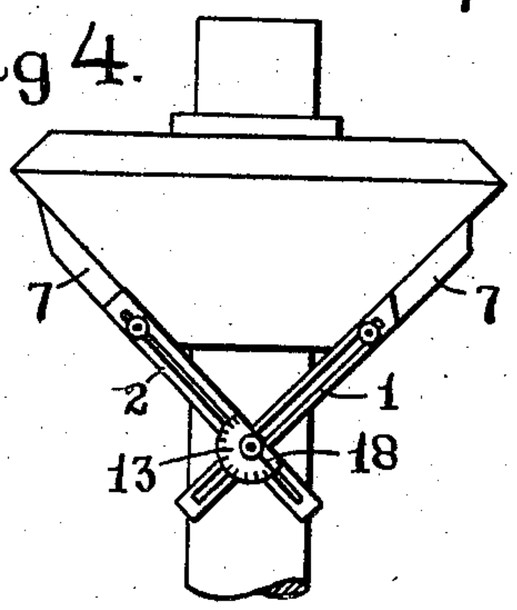


Fig.4.



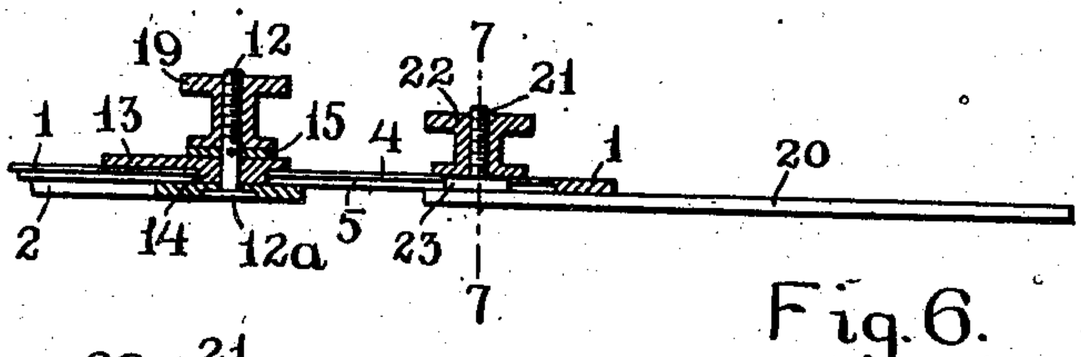


Fig.6.

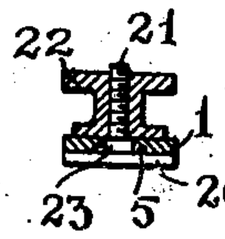


Fig.7.

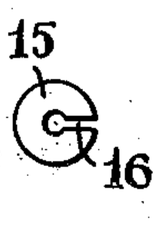


Fig.5.

Witnesses

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UNITED STATES PATENT OFFICE.

PATRICK KELLY, OF WORCESTER, MASSACHUSETTS, ASSIGNOR OF ONE-HALF TO JOHN J. POWER, OF WORCESTER, MASSACHUSETTS.

BEVEL-PROTRACTOR.

No. 842,205. Specification of Letters Patent. Patented Jan. 29, 1907.

Application filed May 14, 1906. Serial No. 316,609.

To all whom it may concern:

Be it known that I, PATRICK KELLY, a citizen of the United States, residing at Worcester, in the county of Worcester and Commonwealth of Massachusetts, have invented a new and useful Improvement in a Bevel-Protractor, of which the following is a specification, accompanied by drawings forming a part of the same, in which—

Figure 1 is a top view of my improved protractor. Fig. 2 is a side view of the same. Fig. 3 is a sectional view on line 3 3, Fig. 1. Fig. 4 is a view of my improved protractor applied to the measurement of a bevel-gear. Fig. 5 is a detached view of the washer for the center screw-post, showing the opening to receive the pointer. Fig. 6 is a view of a modified form of my improved protractor; and Fig. 7 is a sectional view on line 7 7, Fig. 6.

Similar reference letters and figures refer to similar parts in the different views.

My invention relates to an improved protractor which may be used for measuring the angle of bevels, and is arranged to measure, among other bevels, the inclinations or pitch of the wearing-surfaces of bevel-gears or other turned cones; and it consists in the construction and arrangement of parts, as hereinafter described, and pointed out in the annexed claims.

Referring to the accompanying drawings, 1 and 2 denote the blades of the protractor, which are held so as to rotate at 3, as will be hereinafter described. Each of the blades 1 and 2 is provided with a slot 4, which slot is widened on the under side of said protractor to form a longitudinal recess 5. On one end of each blade 1 and 2 is a post 6, which has on its lower end a blade 7, attached to the post. The posts 6 are held on the blades 1 and 2 as follows: Collars 8 on the posts 6 bear against the lower side of the blades 1 and 2. The posts 6 are provided above the collars 8 with square bosses 9, which are received in and held from turning by the recesses 5, and above the bosses 9, extending through the slots 4, are screw-threaded extensions 10, fitted to receive milled nuts 11, which securely hold the posts 6 in position on the blades 1 and 2. If the milled nuts 11 are loosened, the posts 6 are free to move longitudinally in the slots 4 of the blades 1 and 2 and are held from turning by the bosses 9, engaged with the recesses 5. I thus provide offset blades 7, which are fitted to contact with a bevel-gear or other cone-surface on an arbor and ascertain the bevel thereof, as shown in Fig. 4. The blades 1 and 2 are attached at 3, as follows: A screw-threaded post 12 is provided with a head 12^a on its lower end, which engages the recess 5 in the lower blade 2, thereby insuring the rotation of the blade 2 with the post 12. Loosely mounted on the post 12 is a dial 13, which is held to rotate with the blade 1 by means of a boss 14, engaging the slot 4. Above the dial 13 is a washer 15, (shown in Fig. 5,) provided with a radial opening 16 to receive a pin 17, attached to the screw-threaded post 12, and thereby rotating with it, said pin being extended to form a pointer 18 on the dial 13.

Above the washer 15 is a milled nut 19. Upon loosening the milled nut 19 the blades 1 and 2 may be set at any desired angle, the pointer 18 moving with the blade 2 and the dial 13 moving with the upper blade 1, thereby indicating on the dial 13 the angle A between the blades 1 and 2. When the desired angle is obtained, the nut 19 is tightened, and the blades are held from further movement with relation to each other. If the angle to be measured is the bevel of a cone surface, the blades 7 may be adjusted longitudinally on the blades 1 and 2 to bring the desired distance from the pivotal connection between the blades 1 and 2, and the blades 1 and 2 may be adjusted at their pivotal connection to fit the cone to be measured. By removal of the nuts 11, the posts 6, and hence the blades 7, I obtain a hinged protractor which can be used for measuring the bevel of objects where offset contacting blades are not required. As the blades 1 and 2 lie in different planes, I have shown in Fig. 6 an attachment for the upper blade 1, which provides measuring-blades in the same plane. To accomplish this, I attach to one end of the blade 1 a blade 20 by means of a milled nut 21, engaging a screw-threaded post 22, attached to said blade 20, said post 22 extending through the slot 4 of the blade 1 and also provided with a boss 23, which fits the recess 5. Upon loosening the nut 21 the blade 20 may be moved longitudinally on the blade 1, and it is held from rotary movement by the boss 23, engaged by the recess 5. The blade 20 is of the

same thickness as the blade 2, and hence when the nut 21 is tightened to draw the blade 20 into contact with the blade 1 the blades 2 and 20 will lie in the same plane.

I claim—

1. In a bevel-protractor, the combination with pivoted blades, of offset blades attached to corresponding ends of said pivoted blades, movable longitudinally on said pivoted blades but incapable of rotation with relation thereto.

2. In a bevel-protractor, the combination with a pair of pivoted blades, of means for indicating the angle between said blades consisting of a dial concentric with the pivot of said blade and rotatable with one of said blades, and a pointer rotatable with the other of said blades, and a pair of offset blades attached to the corresponding ends of said pivoted blades, said offset blades being movable longitudinally on said pivoted blades but incapable of rotation thereon.

3. In a bevel-protractor, the combination of a pair of pivoted blades, means carried by said blades for indicating the angle between them, a pair of offset blades attached and movable longitudinally on said pivoted blades but incapable of rotation thereon.

Dated this 10th day of May, 1906.

PATRICK KELLY.

Witnesses:

PENELOPE COMBERBACH,

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