(No Model.)

C. E. W. DOW.

PROTRACTOR.

No. 411,741. Patented Sept. 24, 1889.

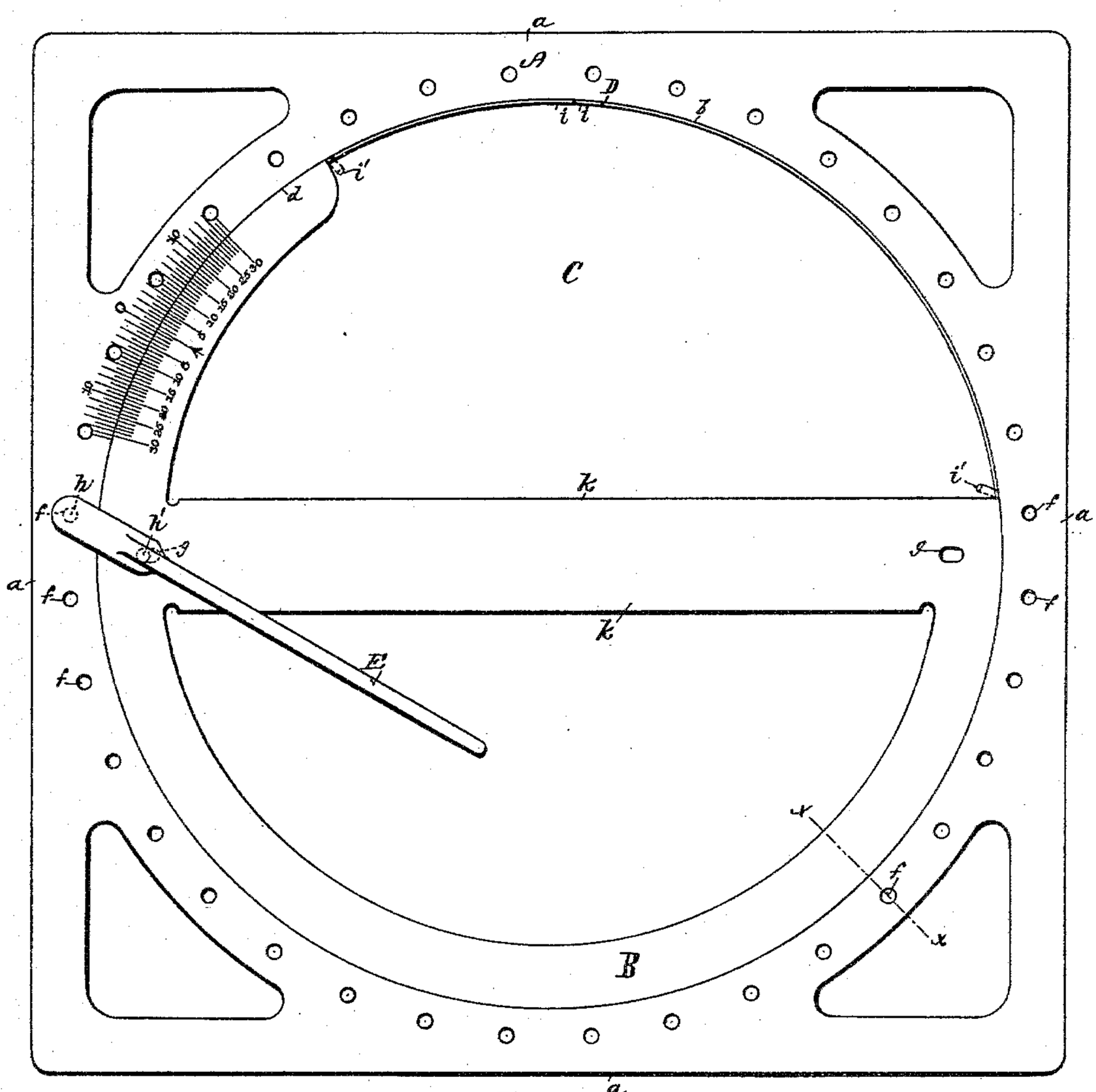

Fig. 1.

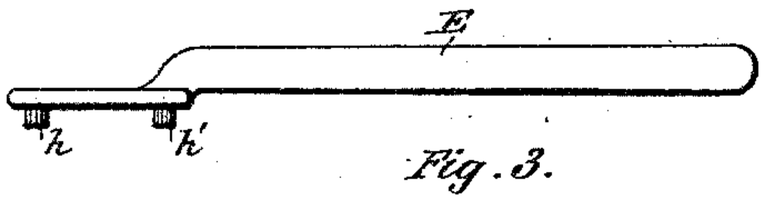

Fig. 3.

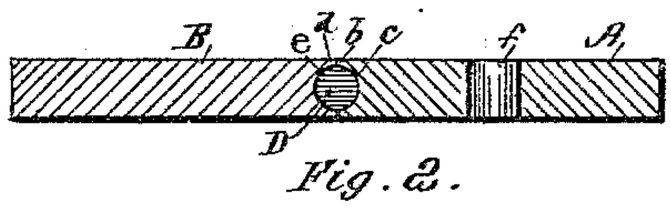

Fig. 2.

Witnesses.
James W Beaumun
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UNITED STATES PATENT OFFICE.

CHARLES E. W. DOW, OF PROVIDENCE, RHODE ISLAND, ASSIGNOR TO DARLING, BROWN & SHARPE, OF SAME PLACE.

PROTRACTOR.

SPECIFICATION forming part of Letters Patent No. 411,741, dated September 24, 1889.

Application filed December 3, 1888. Serial No. 292,537. (No model.)

To all whom it may concern:

Be it known that I, CHARLES E. W. DOW, a citizen of the United States, residing at Providence, in the State of Rhode Island, have invented a new and useful Improvement in Protractors, of which the following is a specification.

The object of this invention is to produce a reversible protractor that can be readily adjusted to the exact angle required, and that shall embrace in its structure great convenience, simplicity, accuracy, and durability; and it consists in the improved construction of the protractor, in the means for securing the arc of the protractor within the circumscribing frame, and in the means employed for imparting movement of adjustment to the arc, as hereinafter fully set forth.

Figure 1 represents a face view of the instrument. Fig. 2 represents an enlarged detail section taken in the line *x x* of Fig. 1. Fig. 3 represents a side elevation of the adjusting-instrument.

In the accompanying drawings, A represents the exterior frame, provided with four sides *a a a a*, which are arranged at right angles to each other. The central portion of the frame A is cut out in circular form, and the edge *b* of the circular opening is provided with a groove *c*, as shown in Fig. 2. The arc B of the protractor, having the straight edges *k k*, is made to fit the circular opening C in the frame A, and is also provided upon its edge *d* with a groove *e*, which corresponds with the groove *c* of the frame. When the sides of the frame A and the arc B at the edge of the opening C have been properly graduated, the two parts are to be placed together in proper position and a curved wire D passed into the opening formed by the opposite grooves *c* and *e*, as shown in Fig. 2, the opposite ends *i i* of the wire abutting each other, as shown in Fig. 1, or being turned at the ends of the arc, as shown at *i' i'*. The parts A and B will thus be properly secured to each other, so that the arc B can be rotated within the opening C and cannot be moved laterally from the said opening, and by the employment of the curved attaching-wire I am able to readily secure the arc B to a frame A, having four continuous sides *a*, without an opening through the same into the space C.

The frame A and arc B are made of about the same thickness, and I provide the frame A with a series of holes *f*, and the arc B with the holes *g*, the said holes *f* and *g* being adapted to receive the pins *h h'*, which project from the face of the adjusting-lever E, by means of which the arc B can be precisely and conveniently moved with reference to the frame A; and in the use of the lever E for this purpose the outer pin *h* may be inserted into one of the holes *f* in the frame A, while the pin *h'* is inserted into the hole *g* in the arc, the hole *g* being made to have sufficient looseness with the pin to permit the proper angular movement of the lever E to produce the required movement of the arc B, and in whatever position the hole *g* in the arc may be placed there can be an adjacent hole *f* for the proper insertion of the pin *h*.

It is to be understood that I do not limit my claim for the adjusting-holes to a frame A having four continuous sides, as shown in the drawings, as one of the sides or one corner of the frame may be cut away to the central opening, as heretofore in the construction of such instruments; and it is obvious that the series of holes *f* can be made upon the arc instead of the frame, if desired; but I have preferred to make the same upon the frame.

I claim as my invention—

1. A protractor having in combination a frame provided with a grooved circular opening and an arc having a grooved edge and fitting the circular opening of the frame, with a wire inserted into the groove between the arc and frame, substantially as described.

2. A reversible protractor having in combination a frame provided with a circular opening and with four sides at right angles to each other, and an arc fitting the circular opening and adapted to make a complete

revolution within the said opening, substantially as described.

3. In a protractor, the combination, with a frame provided with a circular opening and an arc fitting the circular opening of the frame, the frame and arc being provided with adjusting-holes, of the adjusting-lever provided with pins adapted to enter the holes of the arc and frame, substantially as described.

CHARLES E. W. DOW.

Witnesses:
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SOCRATES SCHOLFIELD.