

No. 753,025.

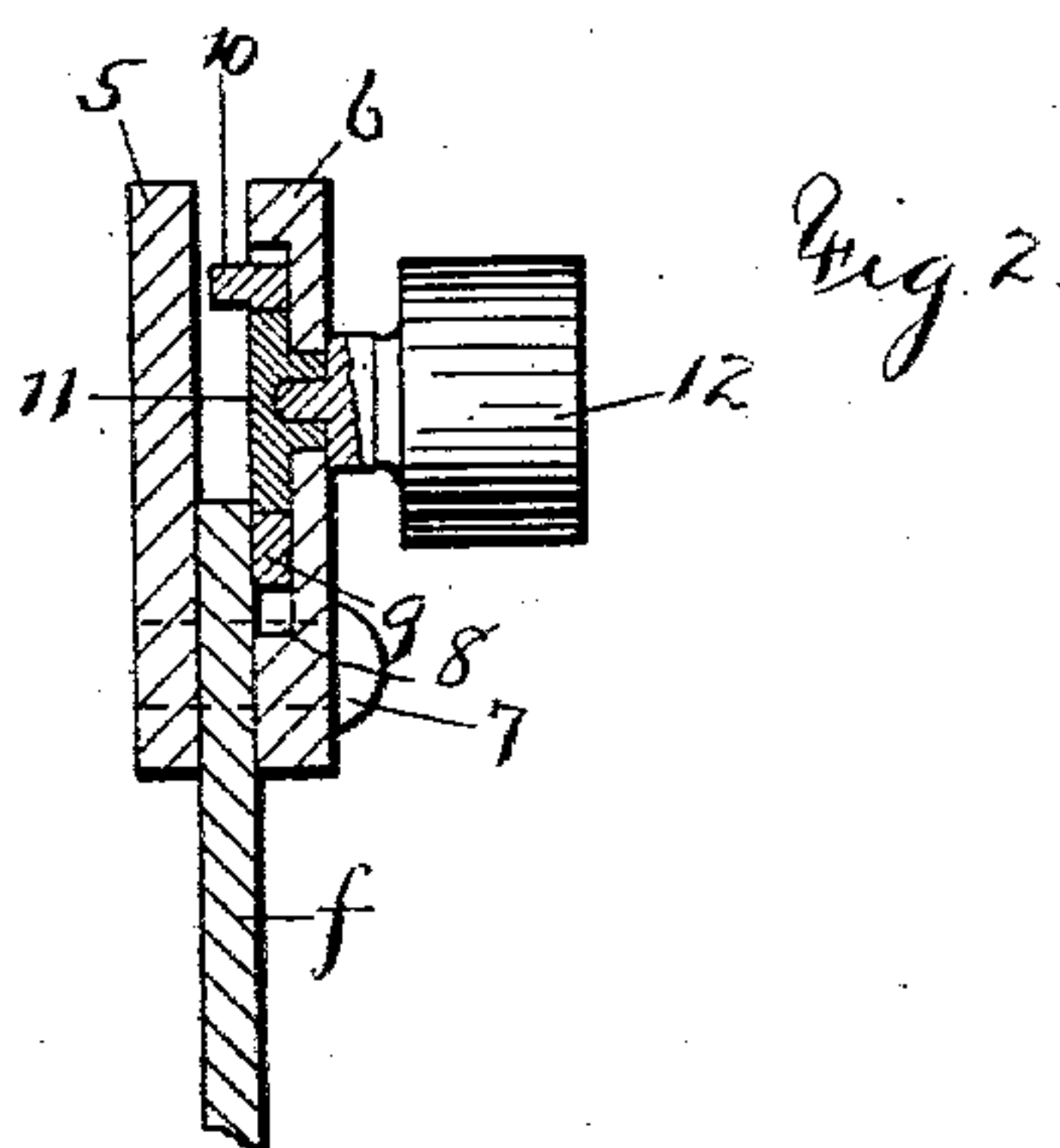
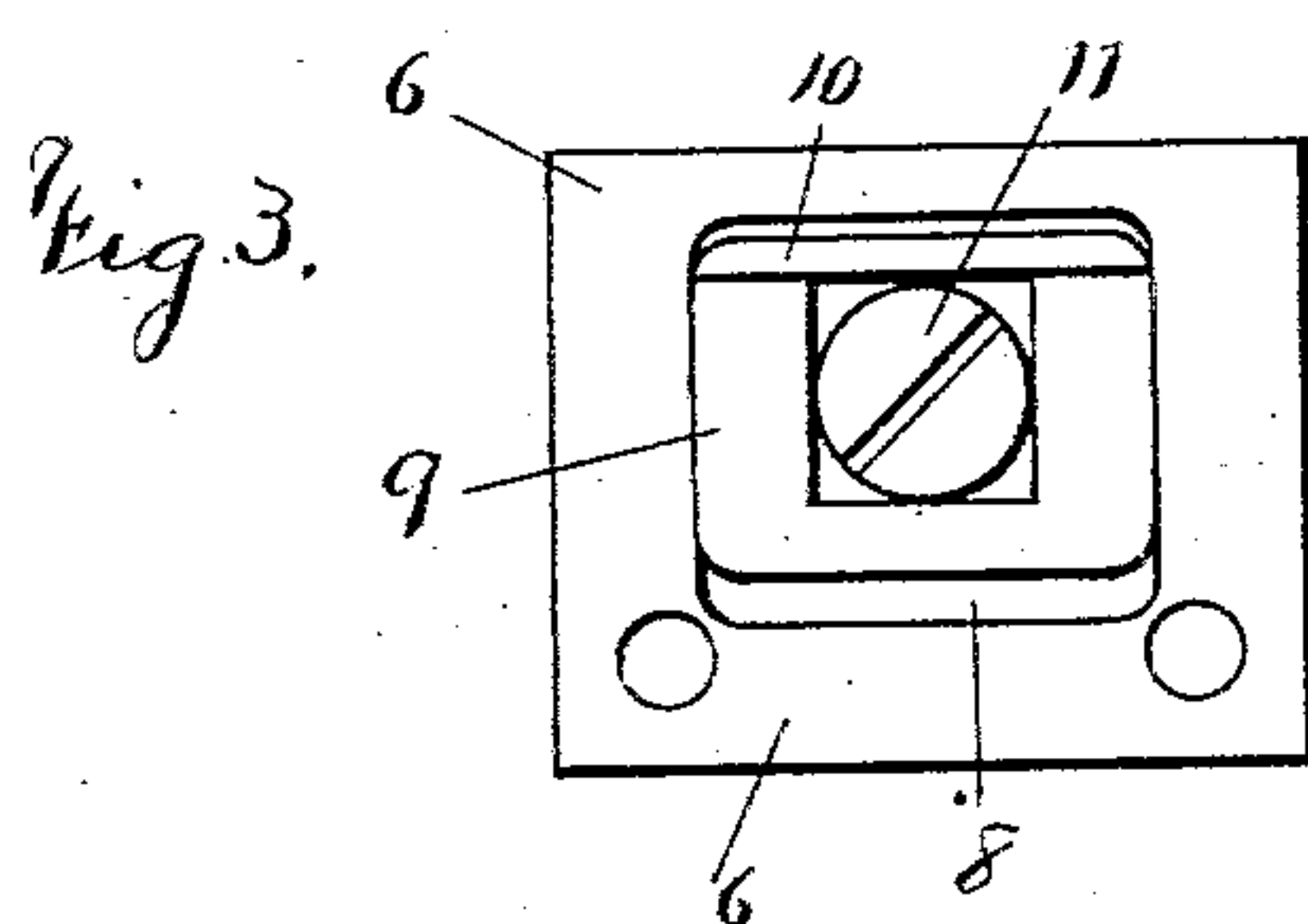
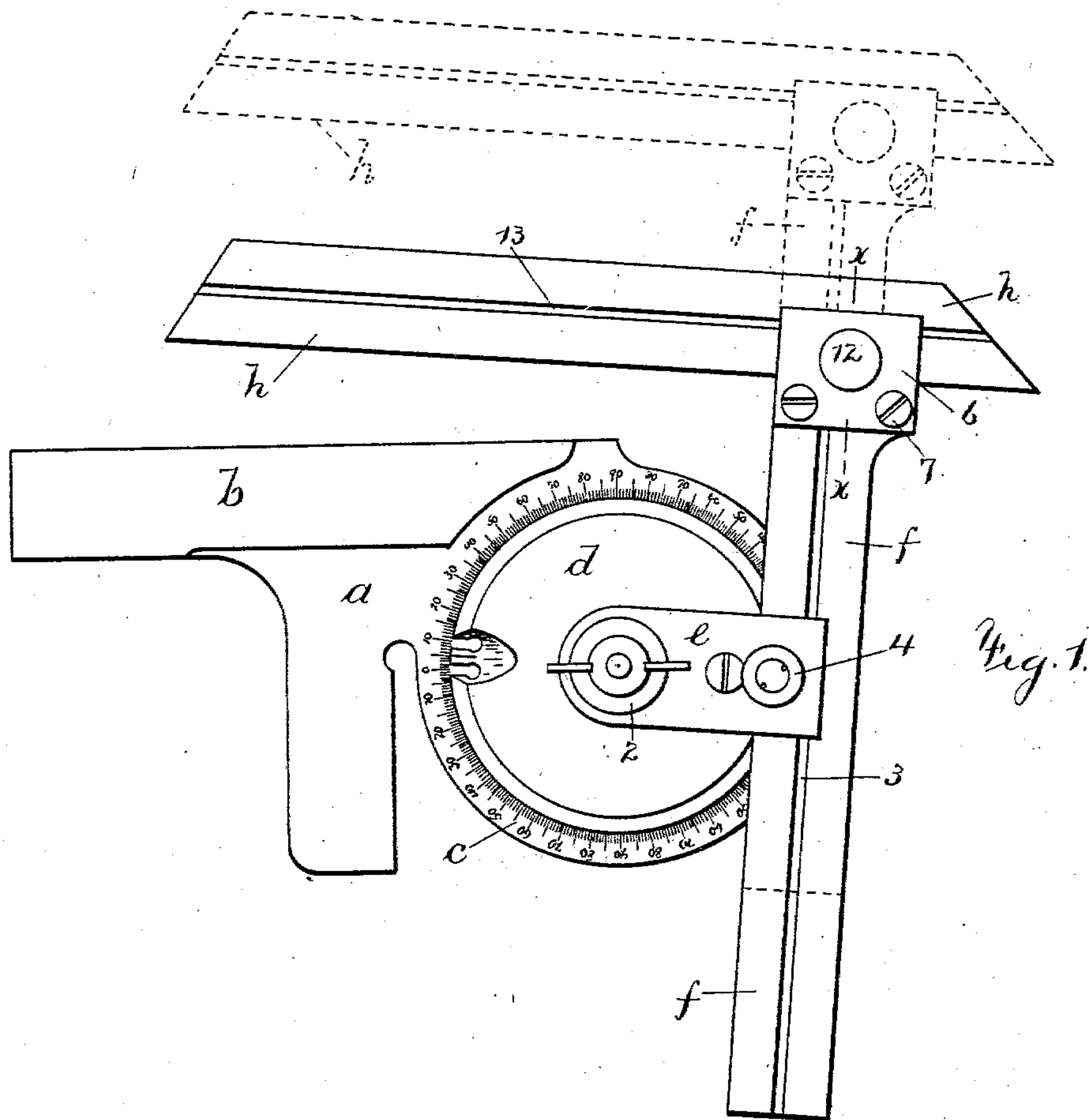
PATENTED FEB. 23, 1904.

H. WOODBOROUGH.
PROTRACTOR.

APPLICATION FILED JULY 2, 1903.

NO MODEL.

2 SHEETS—SHEET 1.



WITNESSES
Admiral
Charles Smith

INVENTOR
Henry Woodborough
PER *Harold L. Lurell*
ATTY.

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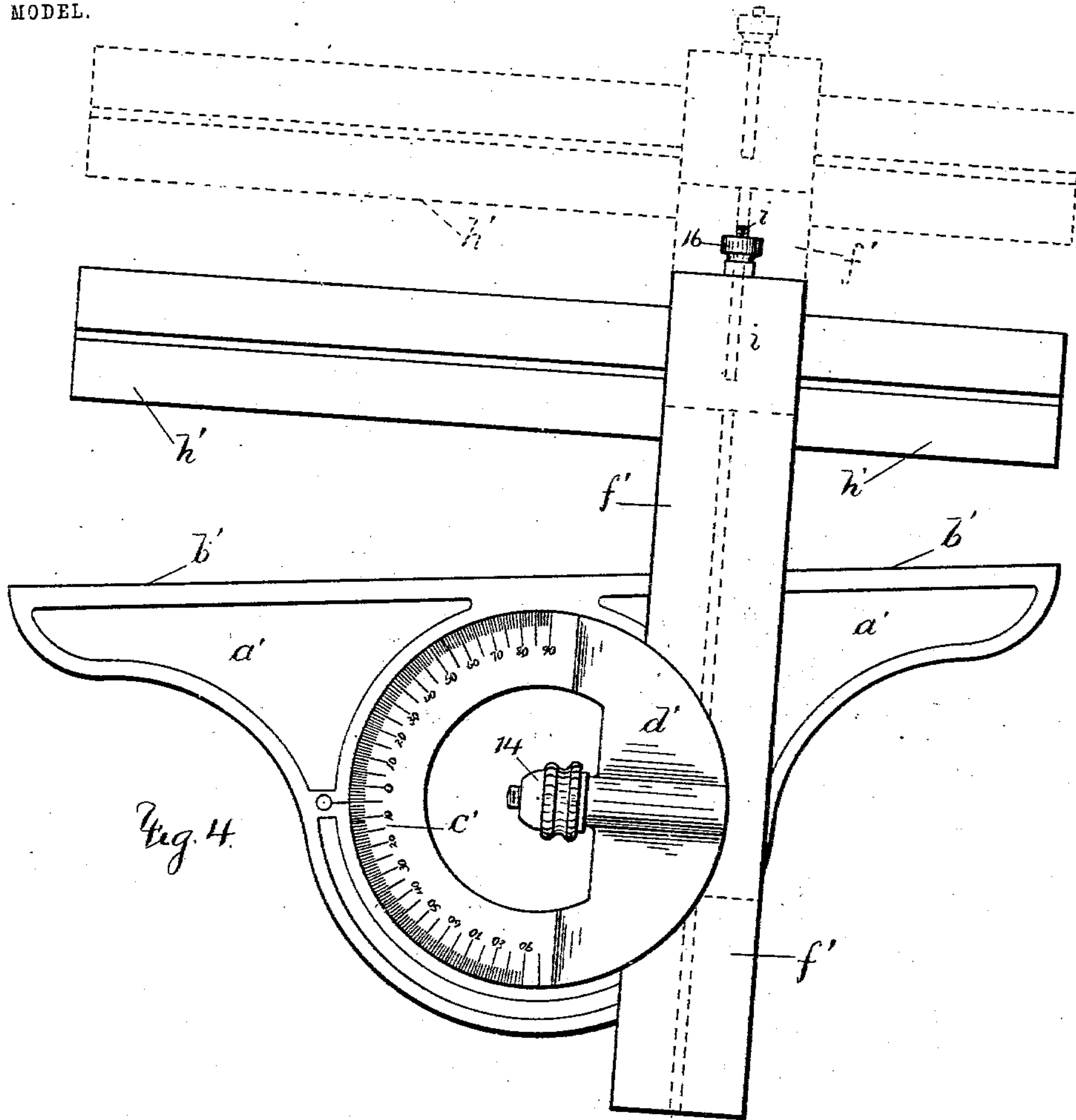


Fig. 6.

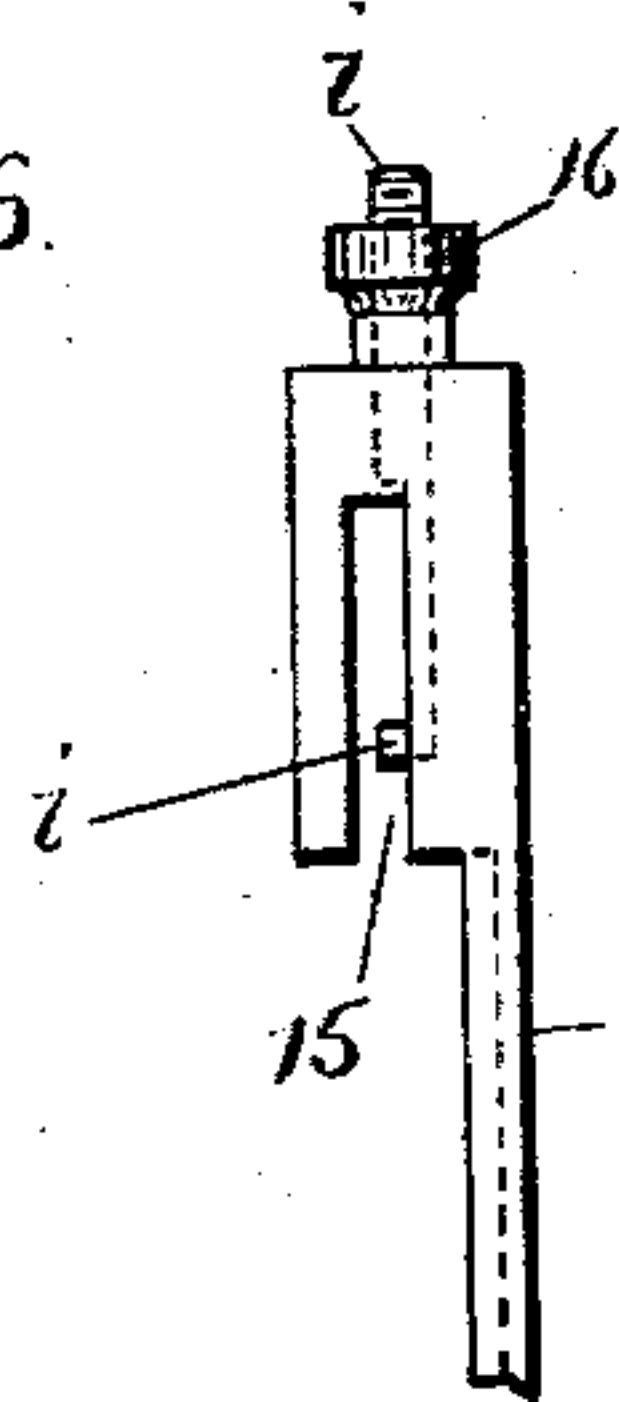
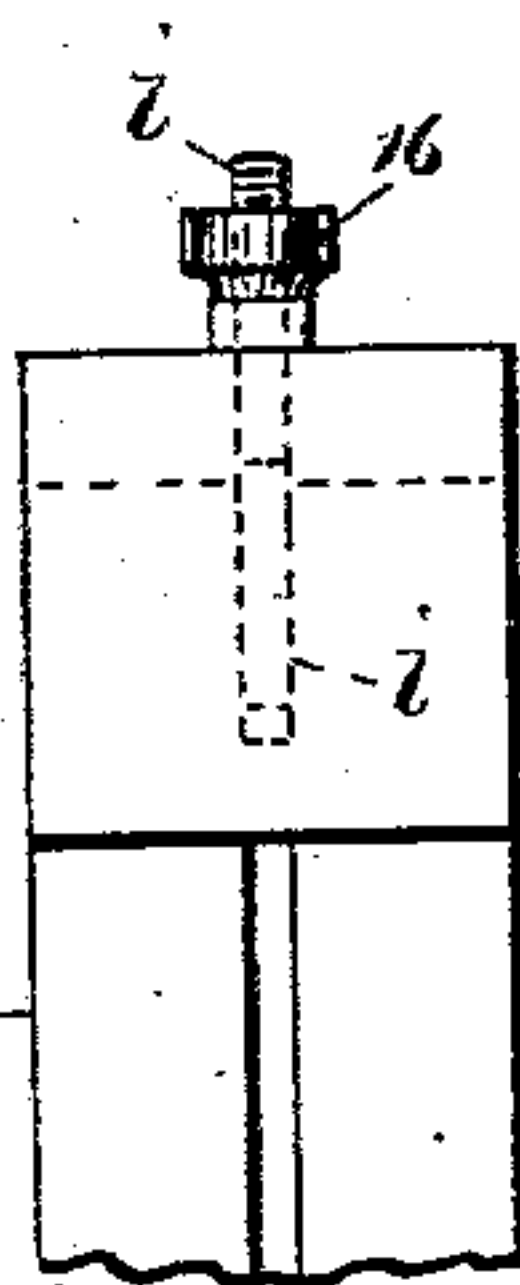


Fig. 5.



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UNITED STATES PATENT OFFICE.

HENRY WOODBOROUGH, OF NEW YORK, N. Y.

PROTRACTOR.

SPECIFICATION forming part of Letters Patent No. 753,025, dated February 23, 1904.

Application filed July 2, 1903. Serial No. 164,020. (No model.)

To all whom it may concern:

Be it known that I, HENRY WOODBOROUGH, a subject of the King of England, residing in the borough of Brooklyn, city and State of New York, have invented an Improvement in Protractors, of which the following is a specification.

My invention relates particularly to the class of adjustable bevel-protractors such as are employed by artisans or workers in wood and metal. Heretofore instruments of this class have comprised a stock and a straight-edge, a dial and indicator, a revoluble arm turning with said indicator, and a slidable blade attached to said revoluble arm, the relation of the blade and straight-edge giving the angle. With these instruments it is impossible to read and work with angles less than about twenty degrees; and the object of my invention is to produce a bevel-protractor with which the very smallest angles readable upon the dial may be measured.

In carrying out my invention and in combination with a protractor of well-known form having a blade slidably-connected thereto and adapted to turn therewith I employ a second blade interchangeable on the indicator with the aforesaid blade and adapted to itself receive said blade at right angles thereto and coacting with the said straight-edge and means for securely holding the indicator and the respective blades in the desired position.

In the drawings, Figure 1 is an elevation of my improved bevel-protractor to the Brown & Sharpe universal bevel protractor. Fig. 2 is an enlarged transverse section on line *xx*, Fig. 1. Fig. 3 is a view of the inner face of one of the end plates connected to the blade. Fig. 4 is an elevation illustrating a modification of my invention as applicable to the Starrett protractor. Fig. 5 is an elevation of the reverse side of the end of the blade shown in Fig. 4, and Fig. 6 is an edge view of the same.

a represents a stock to which, and preferably integral therewith, a straight-edge *b* is secured, and in Fig. 1 *c* is a dial graduated in degrees on one face of the stock *a*. An indicator-disk *d* is revolubly mounted on this face of the dial and has an arm *e* connected with it, and there is a thumb-screw 2, by which

these parts may be secured in any desired position.

I employ a blade *f*, having a longitudinal groove 3 and being adapted to be received in the end of the arm *e* and held in any desired position by a clamp-screw 4 or any other suitable means. At the ends of the blade *f* I prefer to employ two plates 5 and 6, secured thereto by screws 7. The inner face of the plate 6 is recessed at 8 to receive a clamp member or frame 9, having a tongue 10 along one of its sides. A square aperture is formed in the clamp member 9 to receive a screw-head 11, whose shank passes through the plate 6 and is connected to a thumb-screw 12. The shank of the screw-head 11 is off center, so that turning the thumb-screw 12 imparts an eccentric movement to the head 11 and causes a reciprocating sliding movement of the clamp member or frame 9 within the recess 8. The blade *h*, having a longitudinal groove 13 therein, is adapted to be received between the plates 5 and 6 at the end of the blade *f* and at right angles thereto, the tongue 10 engaging the groove 13 and the blade coacting with the protractor. This blade *h* may be the blade employed ordinarily with this form of protractor and removed from engagement with the arm *e* to engagement with the blade *f*.

The clamping construction hereinbefore described as employed at the end of the blade *f* may be employed at the end of the arm *e*, or any suitable clamping devices may be used at both these places. It will be readily understood that the blade *f* is slidably adjustable in the end of the arm *e* and the blade *h* is slidably adjustable in the end of the blade *f* and that both these blades may be held in place in any desired position.

Referring to Fig. 4, *a'* represents the stock, *b'* the straight-edge, and *c'* the dial, which in this instance is revolubly mounted in the stock *a'* and provided with an arm or limb *d'*. The limb *d'* is adapted to receive the longitudinally-grooved blade *f'*, which is slidably adjustable in said limb and may be held in any desired position therein by a thumb-screw 14 or any other suitable means.

As shown in Figs. 4, 5, and 6, the end of the blade *f'* may be made with a head recessed at

15 to receive the longitudinally-grooved blade
h' at right angles thereto, and this head is pro-
vided with an aperture receiving a notched
pin i, one of whose ends engages the groove
5 in the blade h'. The other end of the pin i is
threaded and provided with a thumb-screw 16,
by means of which the blade h' may be clamped
and held in position at right angles to the
blade f'. The blade h' may be the blade em-
10 ployed ordinarily with this form of protractor
and removed from engagement with the part
d' to engagement with the head of the blade f'.

I claim as my invention—

1. A bevel-protractor comprising a stock
15 having a straight-edge, a revoluble arm, a
grooved blade slidable in said arm, means for
clamping said blade to said arm, a second
grooved blade slidable in the end of the afore-
said blade and coacting with the said straight-
20 edge, and means for clamping the said second
blade in position.

2. A bevel-protractor, comprising a stock
having a dial in degrees on one side thereof

and a straight-edge, a revoluble indicator
mounted on said stock, an arm connected to 25
said indicator, a grooved blade slidable in said
arm, means for clamping said blade to said
arm, a second grooved blade slidable in the
end of the aforesaid blade and coacting with
the said straight-edge, and means for clamp- 30
ing the said second blade in position.

3. The combination with a bevel-protractor
of well-known form, of a longitudinally-
grooved blade having a jaw and clamping de-
vices at one end and adapted upon the removal 35
of the grooved blade of the protractor to be
received by the clamping device that held said
blade, and to in turn receive such blade in its
jaw and to hold the same by its clamping de-
vice for the purposes set forth. 40

Signed by me this 25th day of June, 1903.

HENRY WOODBOROUGH.

Witnesses:

GEO. T. PINCKNEY,
S. T. HAVILAND.