(No Model.) 5 Sheets—Sheet 1.

I. N. FORBES.

DRAFTING OR T-SQUARE.

No. 538,671. Patented May 7, 1895.

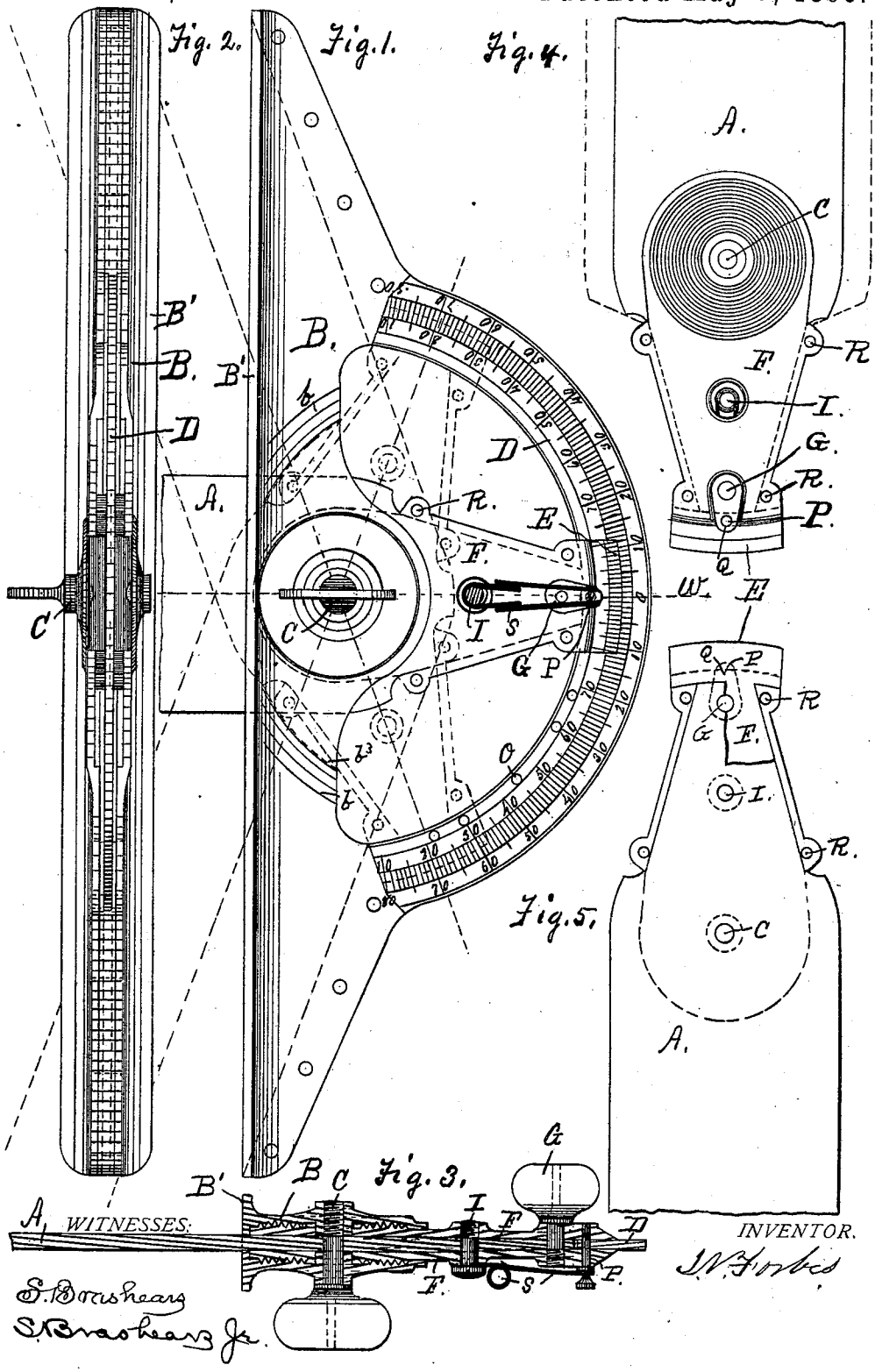

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Fig. 6.

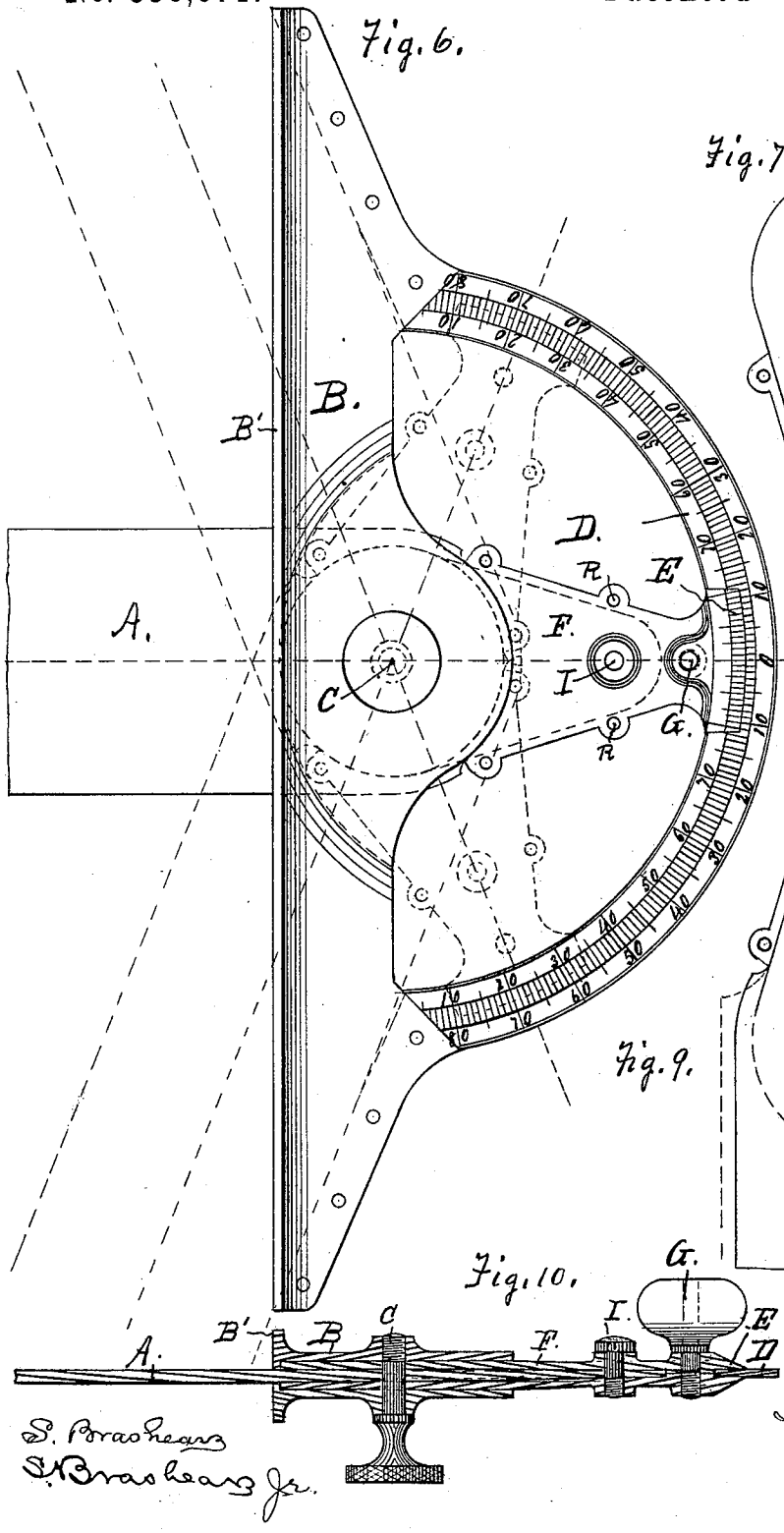

Fig. 7.

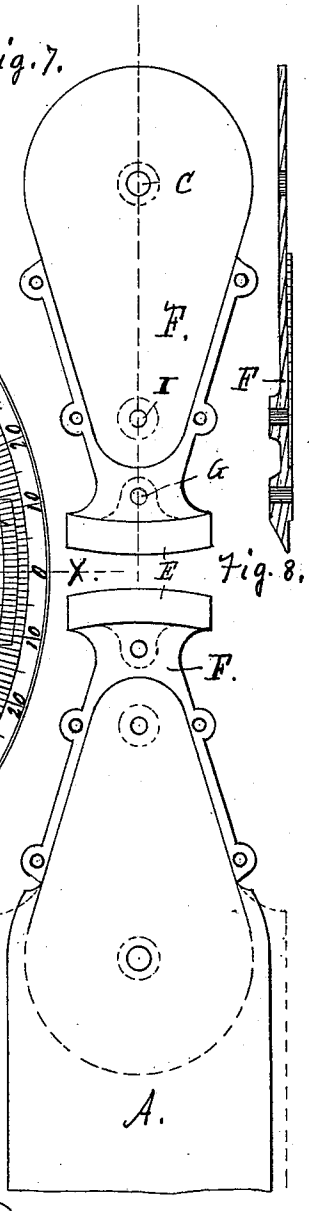

Fig. 8.

Fig. 9.

Fig. 10.

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(No Model.) 5 Sheets—Sheet 3.

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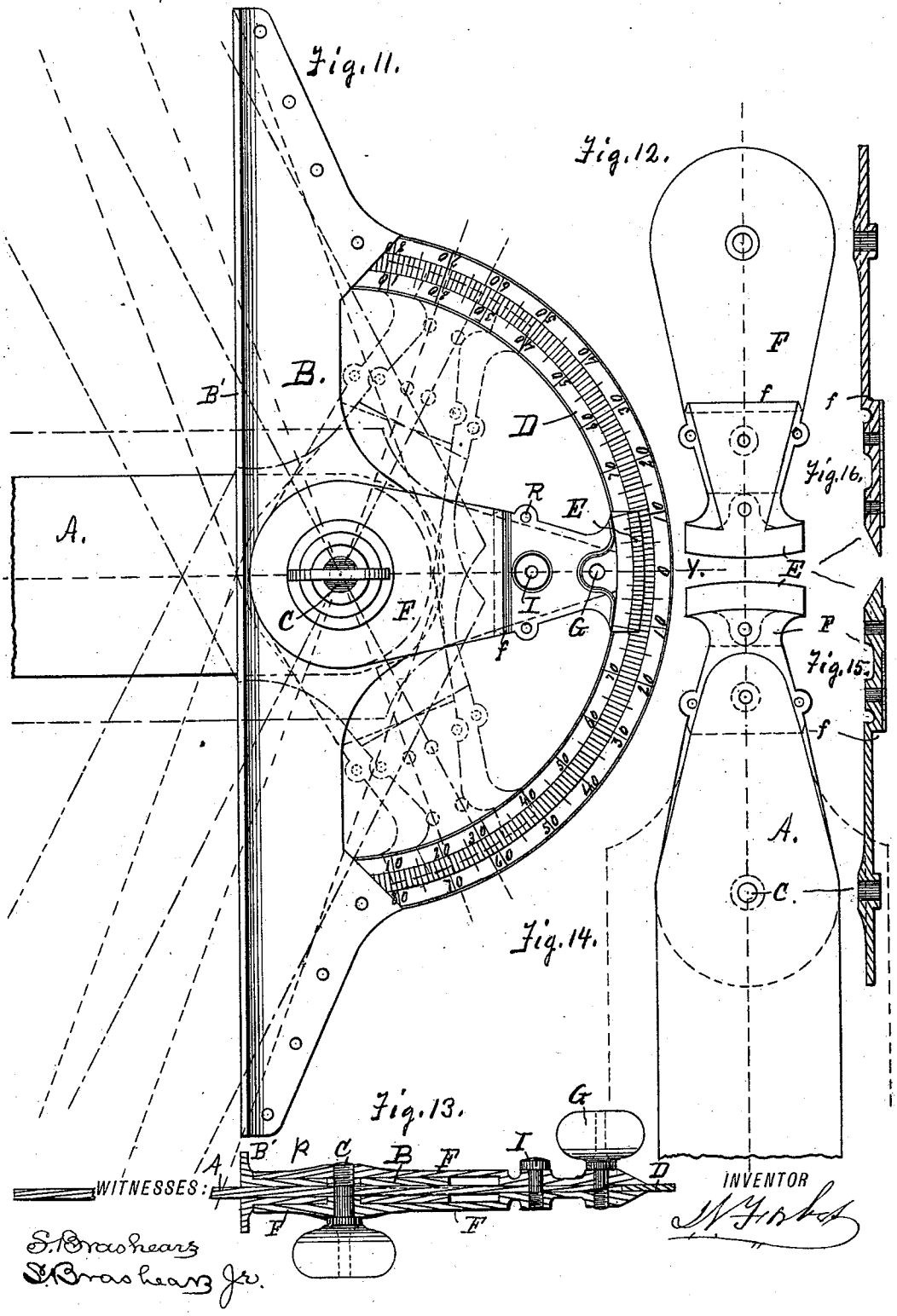

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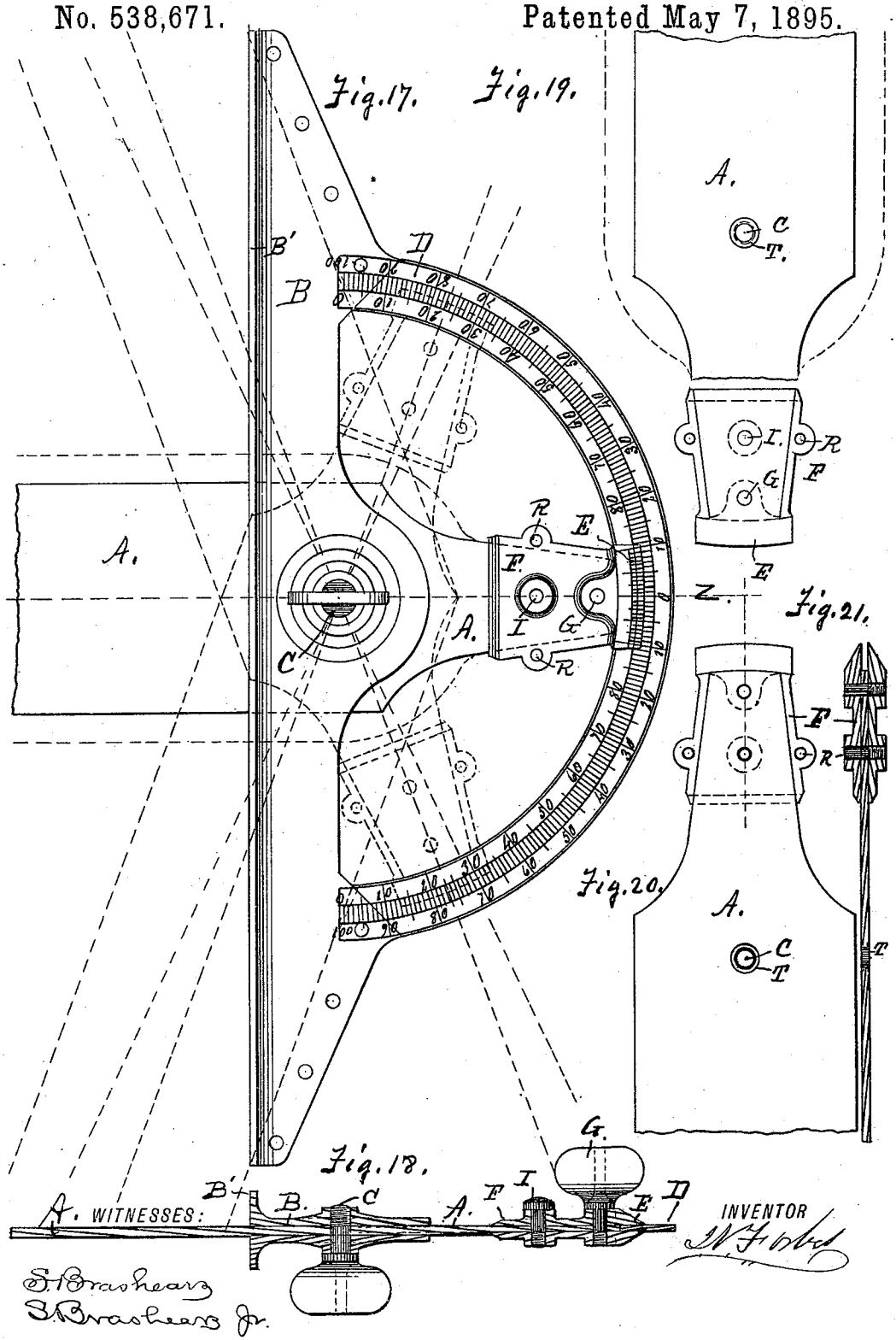

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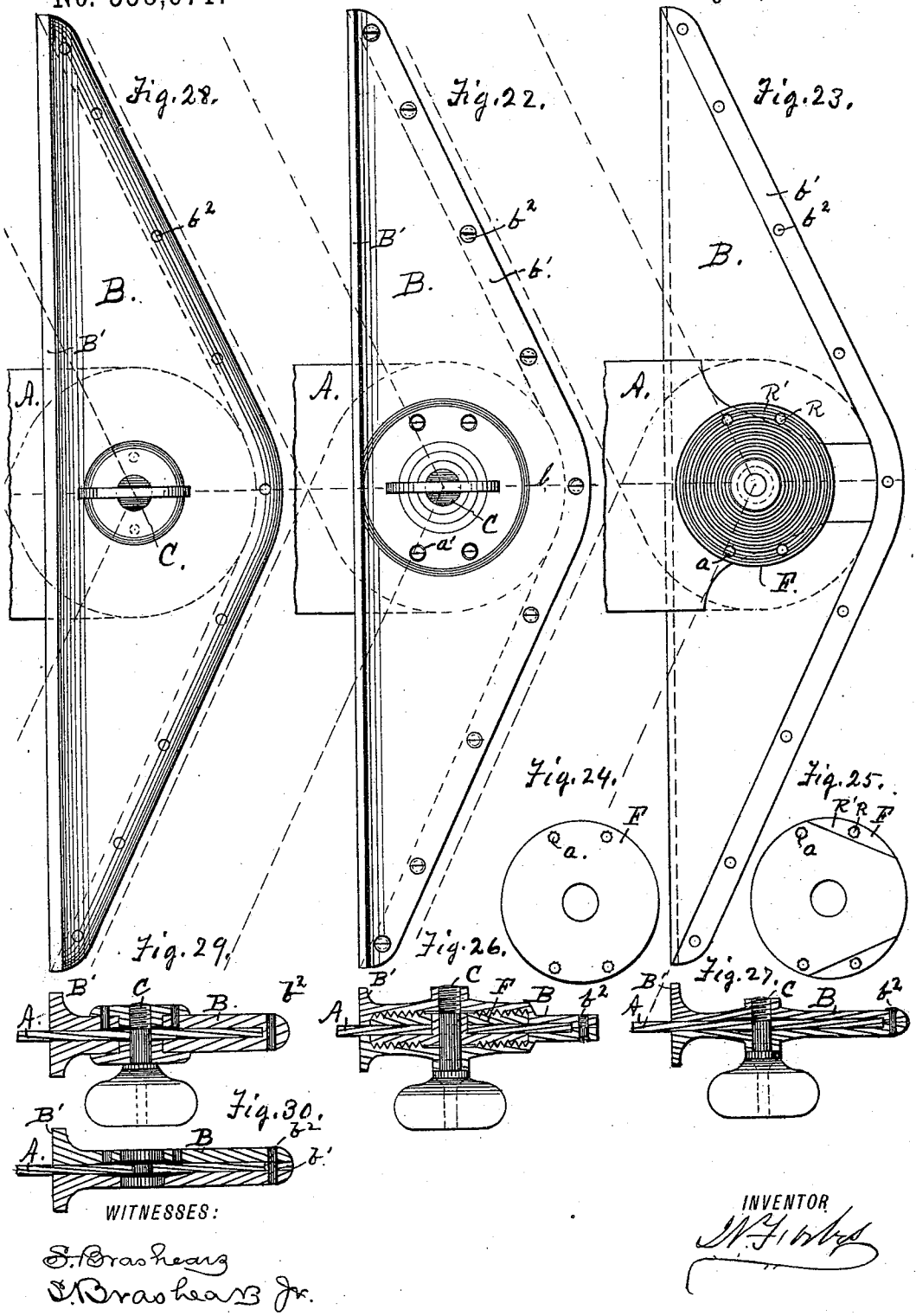

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UNITED STATES PATENT OFFICE.

ISAAC NEWTON FORBES, OF CHICAGO, ILLINOIS.

DRAFTING OR T SQUARE.

SPECIFICATION forming part of Letters Patent No. 538,671, dated May 7, 1895.

Application filed June 4, 1891. Serial No. 395,168. (No model.)

To all whom it may concern:

Be it known that I, ISAAC NEWTON FORBES, of the city of Chicago and State of Illinois, now in Washington, District of Columbia, a citizen of the United States, have invented a new and useful Improvement in Drafting or T Squares, which is made and used substantially as set forth hereinafter, and as shown in the accompanying drawings, in which—

Figure 1 is a general view; Fig. 2, an edge view; Fig. 3, a section; Figs. 4 and 5, details of parts; Fig. 6, a modification; Fig. 10, its section. Figs. 7, 8, and 9 are details of parts of same; Fig. 11, another modification; Fig. 13, its section. Figs. 12, 14, 15, and 16 are details of parts of same; Fig. 17, another modification; Fig. 18, its section. Figs. 19, 20, and 21 are details of parts of same. Figs. 22 and 28 are other modifications, and Figs. 23, 24, 25, 26, 27, 29, and 30 are details of same.

This invention relates to protractor T-squares, for drafting and other uses.

The invention consists in an improved general arrangement and construction of the instrument, and, also, in some important details therein, as shown and set forth.

The improved instrument or tool is made with a blade A, with parallel straight edges on the opposite sides of its two faces for alternative use, in drawing lines, with either face up. The blade is held adjustably in a head B, which has a slot way to receive the blade and allow it to move edgewise for adjustment. The blade and head are held together by a pivot bolt C, which is a clamp screw to set them at any angle desired, for use.

The head B has two side plates connected at the ends, and rearward; and coincident guide faces B′ are formed on their front edges to act against the edges of a drawing board or other surface, and hold the blade thereon in any direction for which it may be set.

The two guides B′ allow the blade to be used with either side up; whereby its setting as a square may be proven by drawing parallel lines along one edge, with the opposite sides up; and so the correspondent of any angle can be got at once by merely turning the instrument over.

A graduated protractor arc D, is held by the head B concentric with the pivot screw C; and a vernier scale E, or angle indicator, is attached to the end of the blade A, for setting the blade at any angle from the arc D.

The arc D, is graduated in any system of divisions desired. Figs. 1, 6 and 11, illustrate the ordinary system of degrees, and Fig. 17, another system. The two faces of the arc may be graduated in different coincident systems.

A clamping device is attached to blade A, to hold it to arc D, at such points as desired. This is made in two parts, or of two plates F, to engage with the two faces of the arc, and has a clamp screw G, to hold them together fast to the arc. These plates F, bear the scale E, or angle indicator, on one or both sides, and extend back and hold the end of blade A between them, and form bearings for it in head B and on the pivot C, to hold the parts true and make them firm and durable.

The edges of the plates F, turn toward each other and are held together and to the blade A, by a screw or bolt I, through them, at a point between the clamp screws C, G, and by screws or rivets R, at the edges. They thus form tapered sockets, and the end of the blade is tapered both ways if necessary to fit into and be held thereby.

The plates F, and the side parts of head B, form bearing faces, between them, around pivot bolt C. These faces have circular concentric cone sided grooves therein, arranged so the ridges between the grooves in one will fit into grooves in the other, wedge like, and so that when forced together by the screw C, they will hold together firmly and prevent turning

The side parts of head B are swelled out to receive the plates F, when turned into the positions indicated in dotted lines in Figs. 1 and 6, forming a recess therefor as indicated by full lines *b*, and dotted lines b^3, in Fig. 1, and full lines, Fig. 2.

The bearings between the blade and the head parts around pivot C, are made concave in one or both, so as to extend the bearing contact as far as practicable from the center, and thus cause it to hold firmly to avoid turning when clamped together by the screw.

The head B has its guide faces made broad and ample for bearings on the drawing board in use. This is done by extending them out from the blade beyond the body of the head, and recessing them back of the guide faces

for the plates F. The parts of the head are made thin and cut away so as to be as light as practicable. They are made of metal, wood or other material.

The arc D is made thin, and its ends are left thicker and extended as filler piece *b*, between the ends of the plates of head B, but additional filler pieces may be inserted with these as indicated by dotted lines in Fig. 2, to give space for the plates F, in some cases and the whole are united firmly by rivets or screws b^2.

The arc D has a series of holes O, at special degrees of angle, as at 90°, 67° 30′, 60°, 45°, 30°, and 22° 30′, and any others required, and a pin P, is held by a spring holder S, held by screw I, or otherwise, to rest in a hole Q in one of the plates F, so it will pass into one of these holes O as the blade is turned, so as to stop and hold the blade true at such angle, but similar means may be used for this. The holes O are confined to half the arc, so as to leave the other half free to admit of turning the blade freely to set at other angles.

The width of the blade may be varied to suit different lengths, to keep its edges straight for use. Such variations of width, and the positions of blade and connected parts set at angles, are indicated by numerous dotted lines.

The invention admits of different modifications to suit different needs and uses, and various parts may be omitted when they are not needed, as illustrated in the several sheets of drawings.

Sheet 1 illustrates the instrument complete. Fig. 1 shows the face of the instrument, with the blade set at right angles, but broken off short. Fig. 2 is an edge view, showing the instrument as seen from the right, along the plane of Fig. 1. Fig. 3 is a cross section showing the parts as on line W of Figs. 1 and 2. Fig. 4 shows the blade A, and its attached parts, separate from the head B, and the concentric grooves for the bearing, on plate F. Fig. 5 shows the same reversed, turned upside down with the top plate F removed, and part of the blade broken out.

Sheet 2 shows the instrument modified, and having the holes O and pin P, omitted, together with the bearing grooves in plate F. Fig. 6 is a general view, similar to Fig 1. Fig. 7 shows the inner face of plate F. Fig. 8 is a lengthwise section of the same. Fig. 9 shows the blade A, applied to plate F. Fig. 10 is a cross section on dotted line X, Fig. 6.

Sheet 3 shows still other modifications, with the plates F extending outside of head B, and without grooves, but forming a double set of bearing contacts on head B to hold the blade true. Fig. 11 is a general view, and Fig. 13, its section on line Y. Fig. 12 shows plate F, with an offset *f* therein. Fig. 14 shows same modified, with blade attached. Figs. 15 and 16 show sections of these forms of plate F.

Sheet 4 shows another modification, where the plates F, do not reach back to the pivot C, but only form short mountings on the end of blade A; and where the bearings of head B come directly onto the blade, which is protected from wear from screw C, by a tubular bushing T, therein. Fig. 17 is a general view, showing short plates F. Fig. 18 is a cross section on dotted line Z. Fig. 19 shows plate F, from the inside, and both ends of the blade broken off. Fig. 20 shows same with blade A, therein. Fig. 21 is a section on center line of Fig. 20, showing both plates F, applied to the blade. In these figures lettering proper for the screws is applied to their holes, where they are omitted.

Sheet 5 illustrates other modifications, where the arc D, and its accompanying parts are omitted, because setting to degrees is not needed, and in small and simple instruments, where the improved joint bearings are sufficient to hold the blade true in position as set, and where the plates F are reduced to mere bearings; as well as where they are wholly omitted. Fig. 22 is a general view. Fig. 23 is the same with one face of head B, removed, showing bearing plate F, with grooves. Fig. 24 shows the reverse side of plate F. Fig. 25 shows same with offsets R′ for socket for the end of the blade A, and holes for screws R. The plates F, in these figures are held to the blade A, by screws, at *a*, and there are holes *a′* in the head B to reach them for insertion or removal, to fasten or take out the blade. Fig. 26 is a cross section on dotted line *l* Fig. 22. Fig. 27 is a cross section of a modification, where the plates F are entirely omitted and the concave bearing joint alone is relied on to hold the blade true as set, for short blades. Fig. 28 shows the instrument in simple form, without plates F, but the bearings concaved, and the whole, blade and head, made of wood, paper stock or other material, with metal screw C, and its nut and washer, and pins. Fig. 29 shows the head in such case, of one piece, with a saw cut or space for blade. Fig. 30 shows the same of two side pieces, with a filler piece *b′* along the back edge.

Where the head B is made of wood, it has pins b^2 glued and driven into holes along the back edge to strengthen it, or unite the parts more firmly; and where the head is of metal it is made thin and light, by shaping sheet or other metal, in dies, or by suitable means, and the side parts are held together by screws, or rivets, b^2.

I claim—

1. An adjustable T square having a blade, A, and a head with two guide faces, B′, acting coincidently on the two faces of the blade, having holes through the head and blade and a pin adapted to fit through both, arranged on one side of a center to hold the parts at several fixed angles, while the other half remains free for setting the instrument at adjustable angles by the clamp screw, C.

2. In an adjustable T square, the blade, A, and its socket formed of two plates, bearing

a scale, E, and having side walls abutted together, fitted against the edges of the blade, and held solid by rivets, bolts, or screws, through plates and blade.

3. In an adjustable T square, a head constructed with two straight guide faces, B′, holding between their ends the ends of a protractor arc, D, by screws or rivets, with intermediate space for drawing blade.

4. In an adjustable T square, an angle indicator, E, having a tapered socket, and a blade, A, with its end tapered to fit the socket, and adapted to be removed and reinserted firmly with its former adjusted relation to the indicator, and provided with a screw or bolt through blade and socket.

5. In an adjustable T square, a head part made with two guide faces B′ having outward projecting edges and thin bodies, with joint bearings therein, cut with a series of concentric cone shaped grooves and ridges adapted to intermesh with a counterpart bearing face to form a firm holding joint.

6. In an adjustable T square, a head part made with two guide faces B′ with outward projecting edges and thin bodies with joint bearings therein made concave about the central pivot to form a firm binding friction holding adjustment joint.

7. In an adjustable T square a blade in combination with a plate thereon cut with concentric grooves and ridges around the central pivot, and with a head with two guide faces B′ with thin outward projecting edges, and a counterpart cut joint bearing to intermesh with that of the blade.

8. In an adjustable T square, a blade having a joint bearing plate thereon cut with concentric cone shaped grooves and ridges around the pivot center, and a head having two guide faces with outward projecting edges, and a thin body with recesses therein for the seats of said plates, and counterpart cut grooves and ridges.

9. In an adjustable T square the blade A, and a scale attachment therefor having a socket to hold the blade formed of two plates having edge walls abutted together so as to fit and inclose the edges of the blade at a distance lengthwise away from the axial pivot on which they are arranged to turn, so that the blade may be removed and reinserted without changing adjustment and having bolts through the plates and blade.

10. In an adjustable T square the guide head, B, and blade, A, held therein by a pivot clamp, C, and bearing a plate, F, having an angle indicator adapted to play over a protractor arc, D, on the guide head, and edge guides forming a fitted socket for the blade at a point lengthwise distant from the turning pivot of the blade and head arranged so that the blade may be taken out and put back in the identical adjustment, and having both a pivot clamp and a clamp to hold the plate, F, to the arc, D, as it may be adjusted and set.

11. In an adjustable T square the head, B, and blade, A, held between two guide faces B′ on the head, and bearing plates on the blade around the central pivot set into recesses in the two engaging faces of the head which form the slot way for the blade to play in.

12. In an adjustable T square, the blade, A, and two plates F, fixed on its two sides and bearing a scale or indicator, E, and a head, B, bearing an arc, D, with scale graduations, between the extensions of said plates, a clamp screw C through said plates, forming the center pivot, and an arc clamp screw, G, to hold adjustment.

13. In an adjustable T square, the head and blade having a joint between them constructed with its two opposed faces each cut with a series of grooves and ridges fitted to mesh together in a wedge like action, and provided with a screw adapted to bind them together to preserve adjustment.

14. An adjustable T square having opposed faces on its head and blade with grooves and ridges meshing together around and distant from the center pivot arranged to act as a holding clamp.

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Witnesses:
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