

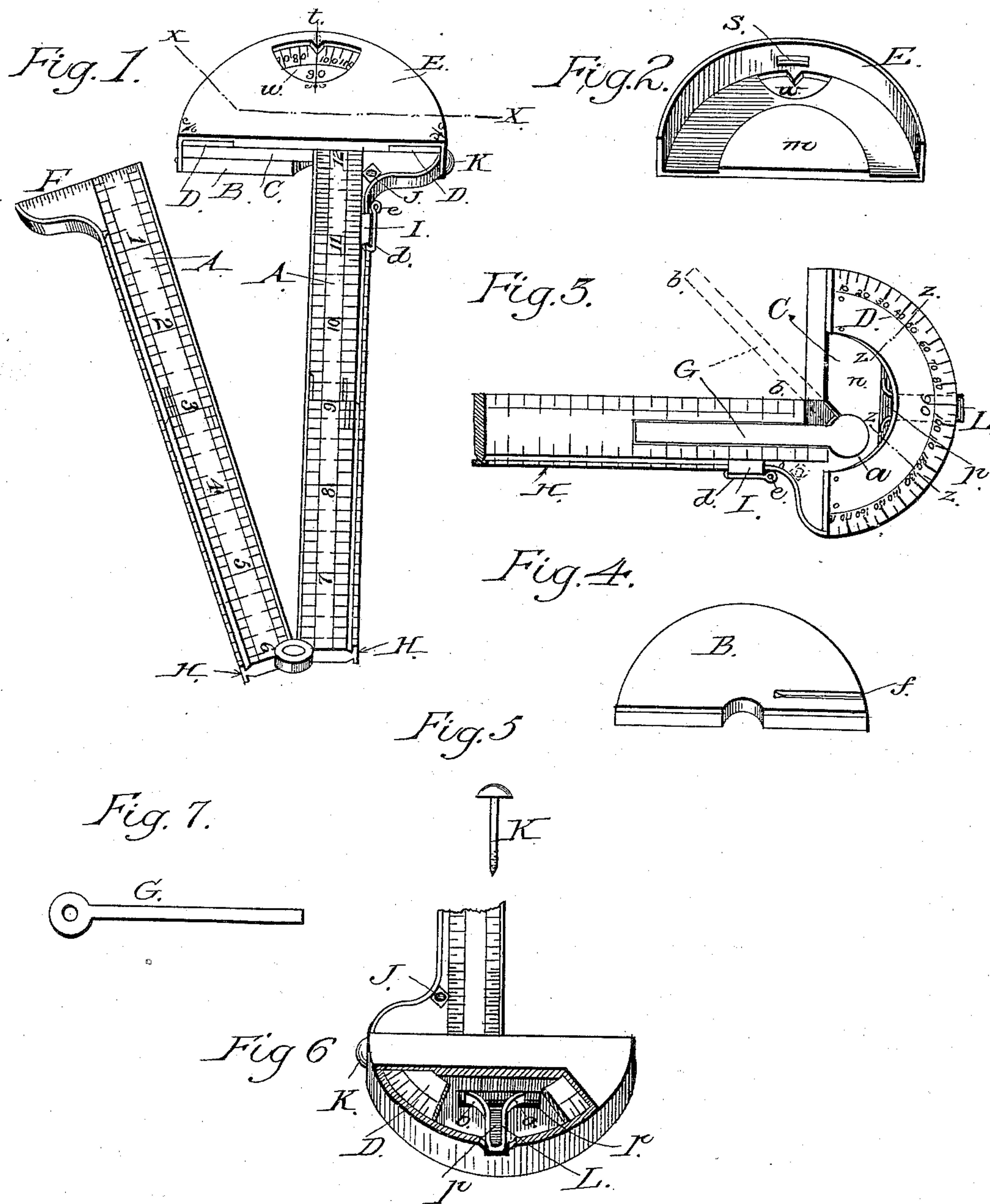
(No Model.)

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COMBINED PLOTTER AND PROTRACTOR.

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COMBINED PLOTTER AND PROTRACTOR.

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To all whom it may concern:

Be it known that I, JOHN RANDALL DUFFIN, of Chester, county of Randolph, State of Illinois, United States of America, have invented a new and useful Improvement in Drafting-Instruments, of which the following is a specification.

The object of my invention is to provide a new and improved drafting-instrument for mechanics and others, which in cheap, simple, and substantial form combines within itself a "measuring-rule," "protractor," "inside try-square," "outside try-square," "bevel-square," "center-square," "T-square," "compasses," "calipers," and "parallel gage," so constructed that it may be conveniently carried in the vest-pocket.

The invention consists in the combination of a folding rule having an outside try-square at one end and an inside try-square at the other end with a "protractor-disk," on which disk a hood having an indicator is adapted to turn. A clasp capable of receiving a center pin is made to slide on the binding of the folding rule. A nut for holding a marking-point is attached to the side of the rule, and a blade for forming a center-square is pivoted to the upper side of the disk C near the right angle of the outside try-square.

The invention also consists in various parts and details and combinations of the same, as will be fully described, and set forth hereinafter.

Reference is to be had to the accompanying drawings, forming part of this specification, in which similar letters of reference indicate corresponding parts in all the figures.

Figure 1 is a perspective view of my drafting-rule lying flat and partly folded. Fig. 2 is a perspective view of the under side and front edge of the upper part or cap of the hood which incloses the protractor-disk. Fig. 3 is a perspective view of the top side and front edge of the protractor-disk, the hood being removed and the graduated flange shown in place. Fig. 4 is a perspective view of the top side and front edge of the semicircular block which forms the bottom of the hood which incloses the protractor-disk. Fig. 5 represents the center pin on which the rule, when used as a compass, revolves. Fig. 6 is a perspective

view of the top and rear edge of the head of the rule, part of the hood being removed, on the line X X X of Fig. 1, and the graduated flange cut and removed on the lines Z Z Z Z of Fig. 3, to show the stop-catch at rest and in place. Fig. 7 is a top view of the center-square blade detached from the rule.

The rule is constructed of a folding rule, A, a bottom block, B, a protractor-disk, C, a flange, D, a cap, E, an inside try-square, F, a center-square blade, G, a rule-binding, H, a clasp, I, a nut, J, a pin, K, and a stop-catch, L. There are also screws and rivets for fixing and attaching the parts together.

The rule may be of any convenient length, made of wood or other suitable material, hinged, bound, and folded together like an ordinary folding rule. On one end is formed a small try-square for trying inside right angles, and on the other end is formed a semicircular disk, C, forming a try-square for the outside of right angles and bearing a protractor-flange, D, which is scaled, as shown in Fig. 3. The flange D is made of metal, and may be about one thirty-second part of an inch in thickness and half an inch in width. It is scaled to five degrees, and by means of a smaller scale on the indicator, to be noticed hereinafter, it may be read to one degree on a two-inch circle. The flange D is secured to the disk C by suitable screws or rivets, and has bearing-edges to receive the hood or cap E. By securing the flange D to the disk C a semicircular recess, *n*, is formed on the top of the disk C, and the cap E has a projection, *m*, which corresponds with this recess *n*. The cap E is placed on the disk C. The projection *m* drops into the recess *n*. The block B is set into the recess formed by the rim of the cap E, projecting below the disk C. The block is secured in place by pins or screws driven through the inclosing-rim of the cap E into the block B. This block fits close against the bottom of the disk C, which is free to turn on the bearings formed by the contact of the rim of the cap E and its projection *m* with the edges of the flange D. A T-shaped recess is sunk about one-sixteenth of an inch deep into the disk C under the flange D. Said recess is marked *p*. Into this recess *p* the stop-catch L is placed, with its closed end pro-

jecting through the opening S in the rim of the cap E, and holding said cap in place when the indicator *t* on the cap E is opposite "90 degrees" on the graduated flange D.

5 The stop-catch L is formed like a square-topped staple, is made of square spring-wire, its free or open ends being reduced to light flat springs *o o* and turned outwardly, so as to bear against the front edge of the recess *p* and hold the closed end of the stop-catch L through the opening S or against the inner surface of the rim of the cap E. A light horizontal groove is cut on the square or closed end of the stop-catch L to receive the thumb-nail when the stop-catch is to be pressed back through the opening S to allow the hood to turn on the protractor-disk C.

A metal blade, G, is let into the top of the disk C and the rule A on the lines V V and pivoted at *a*, so that it may swing to the position *b b* to form the middle blade of the center-square.

A nut or small female screw, J, is let into the side of the rule and secured in place by suitable pins re-enforced by the binding H. The function of this nut J is to carry the marking-point when the rule is used as compasses. The binding H has a dovetailed cross-section, or it may be flat, as shown, in which latter case the edge of the rule where it meets the binding is beveled away, so as to allow the flanges of the clasp I to catch and slide along the rule on the inside of the binding H.

The clasp I has a recess to correspond with the cross-section of the binding H, on which it is free to move from one end of the rule to the other. A spring-tongue, *d*, is attached to and flexed on the clasp I and bent into a barrel, *e*, having a bore to correspond with and receive the scratch or center pin, K. The tendency of the spring *d* is to hold the barrel *e* close against the binding H and prevent it from slipping under slight or accidental shocks. A small notch is cut in the binding H, into which the barrel *e* drops when the clasp I is moved close up against the nut J, in which position the clasp I remains when not in use.

The center pin, K, may be about three-fourths of an inch long, pointed at one end, flattened to a head at the other, and having a cross-section to correspond with the bore of the barrel *e*, in which it works. The pin may be threaded, in which case the barrel *e* must also be threaded to receive it. The pin K when not in use is held in a recess, *f*, in the bottom block, B, a hole being cut in the rim of the cap E, through which the pin K is introduced. The hole in the rim of the cap E may be threaded to receive the male screw of the pin K, when the latter is made with a thread.

The operation is as follows, to wit: When the rule is to be used as compasses, the pin K is placed in the barrel *e* of the clasp I. A short pencil or other marking-point is screwed into the nut J, so as to make its point project be-

low the edge of the rule far enough to engage the surface to be marked. The clasp I, carrying the pin K, is then moved along the binding H to the distance of the radius of the circle required. The pin K, having its point toward the surface to be marked, is pressed into said surface and the marking-point held in the nut J is swung around the pin K, describing a circle on the surface to be marked as it goes.

When the rule is to be used as a T-square, the protractor is turned to ninety degrees under the indicator *t*, in which position the rule is supposed to be when at rest. The upwardly and downwardly projecting edges of the front of the hood or cap E act as the jaws of the T-square, and the arm of the rule, standing at right angles with said upwardly and downwardly projecting edges, serves as the marking-blade of said T-square.

When the rule is to be used as a bevel-square, the stop-catch L is pushed back through the opening S, and the cap E is thus freed, so that it may turn on the disk C. By this means the arm of the rule A is allowed to swing to the right or left to any desired angle. The edges of the cap E in the bevel-square, as in the T-square, act as jaws and the swinging arm of the rule acts as the marking-blade.

When the rule is to be used as a protractor, the cap E is freed, as in the bevel-square, the arm of the rule is swung to the right or left, thus turning the graduated protractor-disk in the hood until the desired degree appears in the opening *w* and under the indicator *t*. The degree read under the indicator *t* is the angle included between the inside edge of the swing-arm of the rule and the front edge of the cap E. The protractor is scaled to five degrees, and to the right of the indicator *t* on the cap E the space of five degrees is scaled to one degree, so that the protractor may be read to one degree. The closed end of the stop-catch L bears against the inside of the rim of the cap E with the force of the springs *o o*, thus preventing slipping and at the same time keeping the protractor steady and close on its bearings.

When the rule is to be used as a parallel gage, the pin K, or any other suitable marking-point, is fixed in the barrel *e* of the clasp I, and the clasp I, carrying the marking-point, is then moved along the binding H to a position on the arm of the rule A which is as far from the front edge of the cap E as it is from the edge of the body to be marked to the point where the mark is required. In the parallel gage, as in the T-square, the front edges of the hood act as the jaws, and the mode of marking is the same as with an ordinary parallel gage.

When the rule is to be used as a center-square, the blade G is lifted out of its bed and swung to the position *b b*, where it is again bedded by falling into a groove made in the disk C, in which place it is held by the cap E when the latter is at ninety degrees from

the arm of the rule A. The use and operation are the same as that of other center-squares.

The use and operation of the rule as an inside try-square, outside try-square, and measuring-rule are self evident and need no further explanation than that shown in the drawings herewith submitted.

The use of the rule as an outside calipers is as follows: The cylinder or body to be measured (only small bolts and such bodies can be measured by my rule) is placed close against the sides of the outside try-square, with its cross-section parallel to the plane of the graduated or scaled arm of the rule. A pencil or other straight-edged instrument is held at right angles with and across both lines of graduation shown on the face of the rule, and in this relation moved down the rule toward the head of the rule until the projecting end of the pencil comes against the outside of the body to be measured at its point farthest from the edge of the cap E, which cap acts as one side of the outside try-square. The diameter of the body is then read at the edge of the pencil on both scales of the rule across which it passes at right angles thereto and in contact with the surface of the body to be measured.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a drafting-instrument, the combination of the rule A, having at one end the disk C, the protractor-flange secured to said disk, and the flanged and movable hood or cap E, fitted over said disk and protractor-flange, substantially as herein described.

2. In a drafting-instrument, the combination of the rule A, having at one end the disk C, the graduated protractor-flange seated on said disk, a hood or cap fitted over said disk and protractor-flange, and the block B, said hood or cap having a flanged portion inclosing the outer edges of the disk, the protractor-flange, and the block, substantially as described.

3. In a drafting-instrument, the rule A, having the disk at one end and the flange D, seated on said disk, and having the open center *n*, in combination with the flanged cap or hood having the projecting portion *m* fitting said opening, whereby a pivot is formed around which the disk moves, substantially as described.

4. In a drafting-instrument, the combination of the rule A, having a disk at one end, the flanged hood or cap having a projection fitted in the open center of the disk, whereby said disk may be turned, and the stop-catch L, seated in a recess formed in the disk, said catch having its outer end adapted to project through an opening in the flange of the hood and its inner or free end bearing against one of the walls of the recess, substantially as described.

5. In a drafting-instrument, the combination of the rule A, the pivoted blade G, let into said rule, and the disk C, said disk having a groove within which the blade fits when swung outward to form the middle blade of a center-square, substantially as described.

6. In a drafting-instrument, the combination of the rule A, having the binding H, the sliding clasp I, having the barrel *e*, the pin K, fitted in said barrel, and the nut or socket J, for containing the marking-point, substantially as described.

7. In a drafting-instrument, the rule A, in combination with a clasp fitted to slide thereon, said clasp having a spring-actuated tongue provided with a barrel or socket, a pin adapted to fit said barrel or socket, and the nut or socket J, carried by the rule and adapted to receive a marking-point, substantially as and for the purpose specified.

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Witnesses:

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