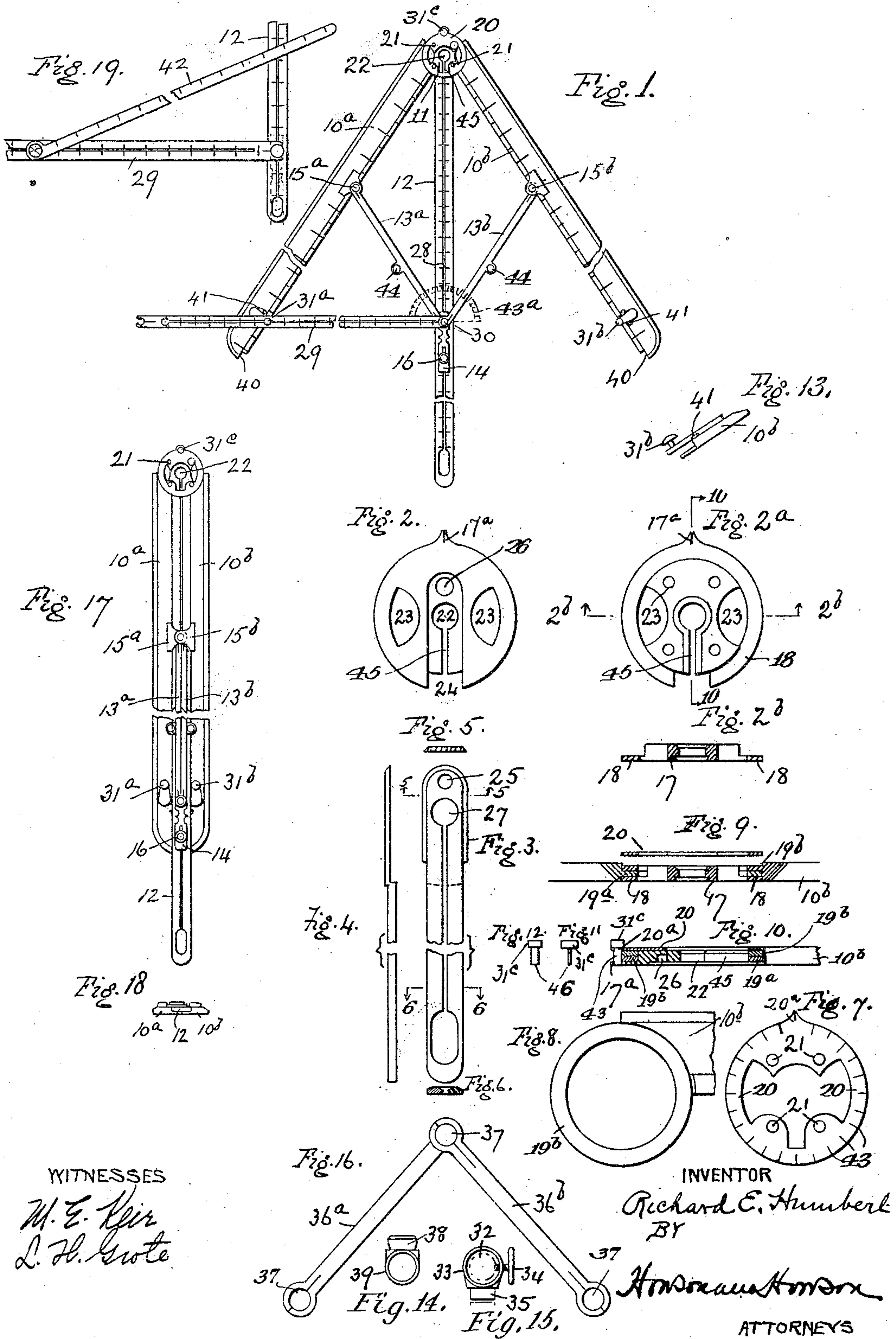


R. E. HUMBERT.
ANGLE FINDER.
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RICHARD E. HUMBERT, OF MILFORD, PENNSYLVANIA.

ANGLE-FINDER.

956,356.

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To all whom it may concern:

Be it known that I, RICHARD E. HUMBERT, a citizen of the United States of America, and residing at Milford, in the county of Pike and State of Pennsylvania, have invented a certain new and Improved Angle-Finder, of which the following is a specification.

My invention relates to a tool for builders or draftsmen and particularly to an adjustable angle finder with various attachments, adapted for use in determining the cuts for roof timbers, bridge trusses, miters and other angled cuts, at the same time being adapted for use as a centering tool, try square, etc. as will appear more fully from the drawings and description.

In the accompanying drawings, Figure 1 is a plan of the tool assembled; Figs. 2 and 2^a are bottom and top plan views respectively of the pivoting hub; Fig. 2^b is a section of the latter on line 2^b—2^b, Fig. 2^a; Fig. 3 is a broken plan view of the center guide arm; Fig. 4 is a side elevation of the same; Figs. 5 and 6 are respectively sections on the lines 5—5 and 6—6, Fig. 3. Fig. 7 is a plan of the cap plate; Fig. 8 is a plan of the pivoting ring carried at the end of one of the angle arms; Figs. 9 and 10 are sections on lines 2^b—2^b and 10—10 respectively, Fig. 2^a, with the angle arms adjusted, but partially broken away, and with the cap plate detached in Fig. 9. Figs. 11 and 12 are side and end elevations respectively of the stop; Fig. 13 is an end view of one of the pivoted arms drawn to a larger scale. Figs. 14, 15 and 16 are plans of the two guides and braces for the centering attachment respectively; Figs. 17 and 18 are respectively plan and end views of the device closed with the sliding guide arm 29 detached; and Fig. 19 is a broken plan showing another attachment.

Referring to the drawings, in which like reference characters denote like parts, the tool in the preferred form shown comprises a pair of arms 10^a and 10^b pivoted at the head and having inner straight edges radially alined with the center of said head. The slotted center guide arm 12 is rigid with said pivoting head. Links 13^a and 13^b of equal length are pivoted at one end to a button 30 on the slide 14, which works in the slot of the arm 12, and at the other end to buttons 15^a, 15^b arranged at different heights

above the straight edges of the arms 10^a, 10^b, so that by moving the slide the angle subtended between the arms is varied at will. A clamp 16 on the slide holds it in the position to which it is adjusted. If it is desired to find the angle of a given corner, the clamp 16 is loosened and the slide used to bring the outer edges of the arms 10^a and 10^b flush with the faces of the corner, whereupon the clamp is tightened and the tool is set for the corresponding cuts. If the angle of the cut to be made is known, the tool may be set by means of a protractor 43 preferably cut on the cap plate 20 of the pivoting head 11 or if desired made in a separate piece 43^a and mounted on the slide 14 beneath the links 13^a, 13^b.

The pivoting head 11 comprises a hub 17 with bearing flange 18 above which the rings 19^a and 19^b, fast to the arms 10^a and 10^b, are mounted. The cap plate 20 which is screwed to the hub at 21 confines the rings to the hub and is in such close engagement therewith that by sufficiently tightening one or more of the screws the arms will be held rigid.

The pivoting point of the arms is at the center 22 of the hub and the inner edge of each arm is alined therewith as above mentioned. To facilitate marking and the exact positioning of the tool this center 22 of the hub is cut away and a radial slot 45 cut to the flange 18 (Fig. 2^a), the sides of the center hole being beveled down to the lower face so that the point at which the cut is to begin, designated by a mark on the timber to be cut, may be readily seen. The sides of the hub body may be cut away at 23 to form peep holes which facilitate the location of the mark. When the center guide arm 12 is made detachable, as is the preferred construction, the hub end thereof is offset as shown and beveled to correspond to the undercut recess 24 in the bottom of the hub. It is also perforated by a hole 25 for a securing screw which registers with the threaded hole 26 in the hub and by another hole 27 which registers with the center hole 22 in the hub. Thus the slot in the guide arm 12 and the inner edge of each of the angle arms 10^a and 10^b are all true with the pivoting center of the hub. The marker is moved through the slot in the arm 12 and along the inner edge of either angle arm. The braces 28 which are employed

to stiffen the slotted arm are set in the back thereof and are of such thin metal as not to materially interrupt the travel of the marker.

5 In connection with the tool as so constructed which is complete in and of itself, I propose to provide a movable slotted arm 29 at right angles to the center guide arm 12, adapted to maintain its angular relation to
10 the latter at all times. This I accomplish by pivoting it at one end to the slide 14, preferably by means of a split claw engaging the button 30, while a pin 31^a arranged on the arm 10^a radially in line with pin 15^a
15 and distant therefrom the length of the link 13^a between its pivoting points works in the slot of the arm. As the slide moves up or down, the pin 31^a working in said slot lifts the outer end of the arm 29 at precisely the
20 same rate since the legs 15^a—31^a and 15^a—30 of the triangle 15^a—30—31^a are of equal length and constantly subtend identical angles with relation to the arm 29, and the latter is thus kept at right angles to the
25 center guide 12 in all positions. A marker may be guided through the slot in arm 29 for cuts at right angles to the center guide 12. If the arm is desired on the other side of the tool, it may be disengaged from the
30 pin 31^a through the enlargement of the slot at the outer end of the arm, and swung over into engagement with the similar pin 31^b on arm 10^b. When closing the tool, this arm may be disengaged from the pin 31^a
35 and brought into engagement with the pin 31^c on the stop 46 which is carried by the slotted lugs 20^a and 17^a on the cap plate and hub respectively.

To use the tool as a centering device I propose to remove the center guide 12 with the
40 slide 14, and substitute a marker or pointer 32 carried in guide 33 with thumb screw 34. To this end the links 13^a and 13^b which extend from the side arms to the slide are
45 made readily detachable, for instance by splitting the metal near the holes in the ends so that they may be easily slipped on or off the button 30 as required, and secured to the button 35 on the guide 33. A brace comprising arms 36^a and 36^b provided with similar
50 holes 37 may also be supplied to carry a supplemental guide 39 through which the marker 32 may be passed. This supplemental guide 39 is held directly above the
55 main guide 33 by the braces 36^a and 36^b which are both snapped over the button 38 at one end, while their free ends are snapped over the buttons 44 on the angle arms 13^a and 13^b. Obviously the guides remain ver-
60 tically alined although the distance that they are spaced apart varies with the angle subtended between the angle arms 10^a, 10^b.

It will be noted that the ends of the arms 10^a and 10^b are cut away at 40 on the inner
65 edge to form shoulders adapted to engage

the sides of a plank, so that the pointer 32 will indicate the center line thereof. Furthermore the outer edge is angled or curved down so as to form a point, enabling the device to be used as a rough compass if de- 70 sired.

If a try square is not handy, the present tool may be transformed into one by disengaging the center guide and links. After
75 adjusting the arms to an angle of 90° with relation to each other by means of the protractor, they are held rigid by screwing down the cap plate 20 as above described. They may of course be adjusted to any other angle equally as well. 80

The length of rafters may be readily ascertained when the length of the king post and tie beams are known, by means of a straight edge 42 (Fig. 19) sliding on a but-
85 ton in either of the slotted guide arms, (for instance the horizontal arm 29) and provided with similar graduations.

In order that the tool may lie flat upon the surface of the plank, drawing board or the like, the lower faces of the angle
90 arms and center guide are all made to lie flush with each other. I also propose to graduate the angle arms, center and cross guides in any desired fashion.

When folded together the tool forms a 95 compact instrument resembling a foot rule in appearance, the flanges on the angle arms forming the straight edges lying under the slotted center guide. The lugs carrying the buttons 15^a, 15^b being of different heights 100 lie one above the other, while the lugs carrying the pins 31^a, 31^b are pivoted on the arms 10^a and 10^b and may be swung back out of the way when the center guide is engaged with the pin 31^c on the head. 105 When in use these lugs are held in position by slight rounded projections 41 on the angle arms.

Obviously the tool may be varied in many details without departing from my inven- 110 tion and I do not limit myself to the precise structure shown.

I claim as my invention:

1. In a tool of the character described, a pivoting head perforated at the center 115 point to form a peep hole, an angle arm swinging on said pivoting head and having a straight edge in line with said center, and lying outside thereof so as to leave said peep hole unobstructed together with a guide arm 120 rigid with said pivoting head and provided with a slot in line with said center point, substantially as and for the purpose described.

2. In a tool of the character described, a 125 pivoting head perforated at the center point for the purpose specified, an angle arm swinging on said head, a guide arm rigid with said head and provided with a slot in line with said center point, a slide on said 130

guide arm and a link connecting said slide to said angle arm, in combination with a second guide arm at right angles to the first mentioned arm carried at one end by said slide and means for securing a sliding engagement between said angle arm and said second guide arm whereby the latter is moved up and down said first mentioned guide arm upon actuation of said slide but constantly maintains its right angular relation thereto, substantially as described.

3. In a tool of the character described, a pivoting head perforated at the center point for the purpose specified, two angle arms swinging on said head, a guide arm provided with a slot in line with said center point, a slide on said arm and links connecting the same to said angle arms, in combination with a second guide arm at right angles to the first mentioned arm pivoted at one end to said slide and means for establishing a sliding engagement between said arm and either of said angle arms, whereby said guide arm is moved up and down said first mentioned guide arm upon the actuation of said slide but constantly maintains its right angular relation thereto, substantially as described.

4. In a tool of the character described, a pivoting head, angle arms freely swinging thereon and provided with buttons equidistant from said pivoting head, suitable cooperating attachments, in combination with links of equal length provided with spring loops at each end whereby one end of each may be snapped into pivoted engagement with the buttons on the respective arms and their other ends snapped into pivoted engagement with said attachments, substantially as described.

5. In a tool of the character described, a pivoting head perforated at its center point and radially slotted therefrom, an angle arm pivoted on said head and a slotted guide arm rigid with said head, the slot in said guide arm being in line with the radial slot in the head, all of said members having their lower surfaces substantially flush, as and for the purpose described.

6. In a tool of the character described, a pivoting head comprising a hub with peripheral flange, a center guide arm rigid with said hub, an angle arm swinging on said head by means of a ring mounted above said flange, a retaining cap above said ring and forming a protractor together with

means to secure said cap to said head, substantially as described.

7. In a tool of the character described, a pivoting head comprising a hub with peripheral flange, a center guide arm detachably secured thereto, a pair of angle arms swinging on said hub by means of rings mounted thereon above said flange, together with a retaining cap carried by said hub above said rings and means in connection therewith for frictionally engaging said rings between said flange and cap to hold them rigid, substantially as described.

8. In a tool of the character described, a hub and arms pivoted thereon having straight edges lying outside said hub, said hub being cut away at the pivoting center to afford an unobstructed peep hole together with means lying above said hub for confining said arms freely pivoted thereon, substantially as described.

9. In a tool of the character described, a stationary arm and a slide thereon, a swinging arm pivoted thereto at one end and provided with a pin, a sliding arm engaging said pin and pivoted at one end to said slide on the stationary arm, together with a link pivoted at one end to the swinging arm at a point midway between its pin and its joint with the stationary arm, and radially aligned therewith, and at the other end to the slide at the pivoting point of the sliding arm, the distance between the two pivoting points of the link being substantially equal to the distance between its pivoting point on the swinging arm and the pin on the latter, whereby the angular relation between said sliding and stationary arms is maintained when said slide is actuated, substantially as described.

10. In a tool of the character described, a pivoting head comprising a hub with a peripheral flange, rotary members pivoted on said hub above said flange, together with a confining disk and means to secure said disk above said hub whereby said rotary members are held in position, said disk and hub being perforated at the pivoting center to form a peep hole substantially as described.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses.

RICHARD E. HUMBERT.

Witnesses:

WALTER ABBE,
L. H. GROTE.