

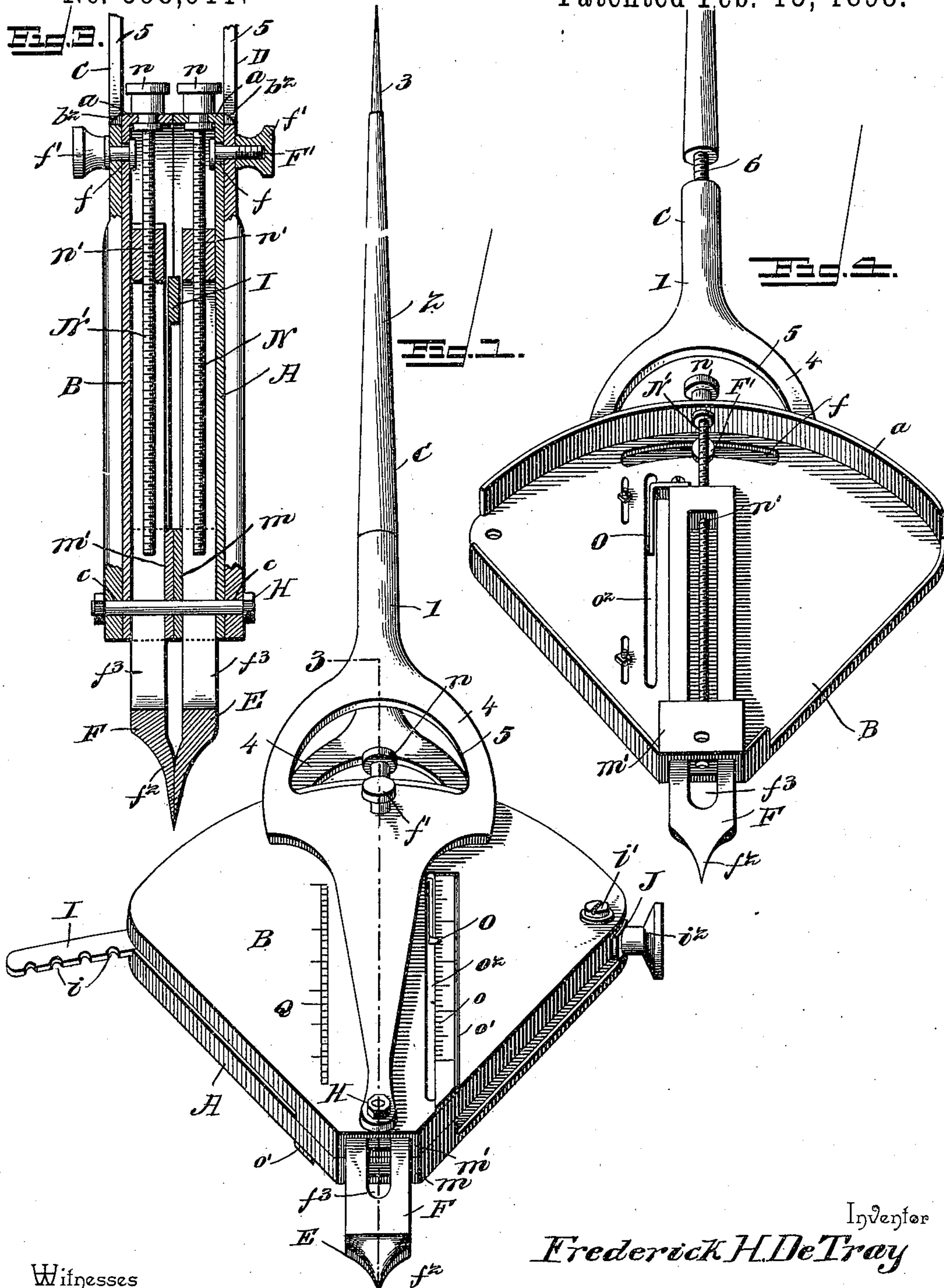
(No Model.)

2 Sheets—Sheet 1.

F. H. DE TRAY.
DIVIDERS.

No. 598,911.

Patented Feb. 15, 1898.



Witnesses

E. Stewart By *J. W. De Tray* Attorneys,

H. J. Benslow

Inventor
Frederick H. De Tray

C. A. Snow & Co.

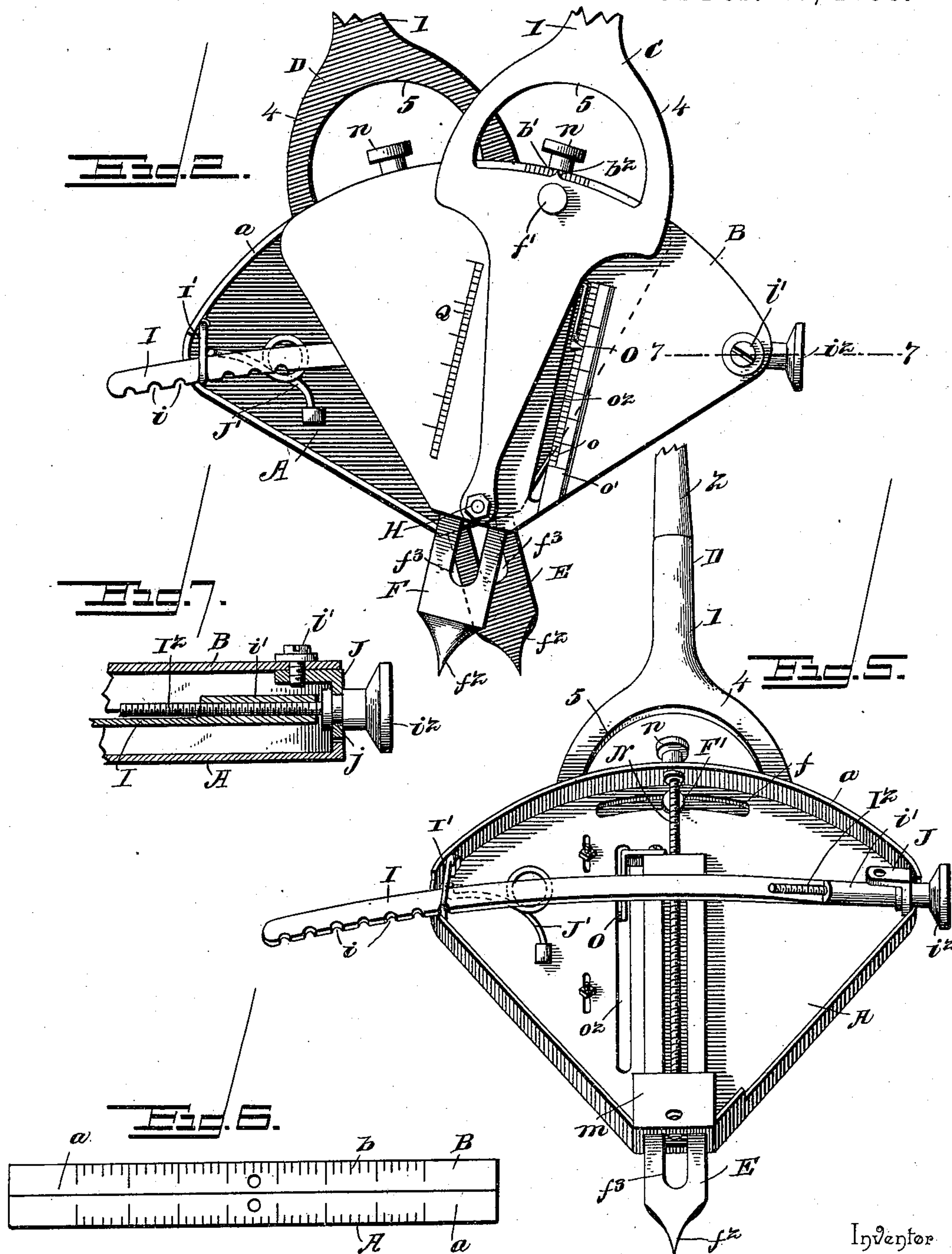
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UNITED STATES PATENT OFFICE.

FREDERICK H. DE TRAY, OF QUINCY, ILLINOIS, ASSIGNOR OF ONE-HALF TO
CHARLES U. COLBURN, OF SAME PLACE.

DIVIDERS.

SPECIFICATION forming part of Letters Patent No. 598,911, dated February 15, 1898.

Application filed August 5, 1897. Serial No. 647,211. (No model.)

To all whom it may concern:

Be it known that I, FREDERICK H. DE TRAY, a citizen of the United States, residing at Quincy, in the county of Adams and State of Illinois, have invented a new and useful Dividers, of which the following is a specification.

My invention relates to improvements in dividers for use by architects, draftsmen, surveyors, civil engineers, professors of mathematics, and mechanics for demonstrating mathematical problems. My dividers are provided with geometrical scales and the elements of the dividers are so constructed and arranged for service as to be used in a manner to save the time consumed in figuring out mathematical problems, thus effecting economy in time, material, and expense.

One object of my invention is to provide a simple and compact construction of parts in which long and short arms are employed in such a way as to enable the points of the short arms to disclose the decimal part of a foot, while the long arm shows one foot or any multiple thereof.

A further object of my invention is to secure a nicety of adjustment in the several elements of the dividers and to provide means for retaining in the adjusted positions each and all of the elements which comprise the dividers.

With these ends in view my invention consists in a pair of quadrant-shaped plate-like members provided on their segmental edges with a geometrical scale, a pair of long arms connected to said members, a pair of extensible short arms adjustably attached to the members, and a pivotal connection which operates to connect the long arms to the plate-like members to pivotally attach the members one to the other and to hold the extensible short arms in proper relation to the plate members and the long arms; and the invention further consists in the means for adjusting the several elements of the dividers and in the novel construction and combinations of parts, which will be hereinafter fully described and claimed.

To enable others to understand my invention, I have illustrated the preferred embodi-

ment thereof in the accompanying drawings, forming a part hereof, and in which—

Figure 1 is a plan view of my dividers with the elements closed. Fig. 2 is a view with the parts spread open. Fig. 3 is a longitudinal sectional elevation on the plane indicated by the dotted line 3 3 of Fig. 1. Fig. 4 is a perspective view of one half of the implement, and Fig. 5 is a perspective view of the other half of the same. Fig. 6 is an edge view of the quadrant members. Fig. 7 is an enlarged detail section on line 7 7 of Fig. 2.

Like letters and numerals of reference denote corresponding parts in all the figures of the drawings, referring to which—

A B designate two members of the dividers, C D the pair of long arms, and E F the short arms, which, with their several adjusting and holding contrivances, I will now proceed to describe in detail.

The members A B are made in the form of quadrant-shaped plates of corresponding size and flanged at their curved edges and at the angle formed by the converging straight side edges, so as to ride one upon the other when adjusting the instrument to open or close the plate-like members, said members when closed registering exactly one with the other. On the segmental flanged edges *a* of the quadrant-shaped members is provided the geometrical scale *b*, (shown by Fig. 6 of the drawings,) and at the center of the segmental edge of each quadrant member there is provided on the face of the member an indicator point or line *b'*, with which is adapted to coincide a prong or spur *b²* on the proper long arm devoted to each plate, so that the user may readily determine when the long arm is adjusted to a position at the exact center of the quadrant member.

The long arm C is devoted to and adjustably connected with the quadrant member B, while the other long arm D is in like manner adjustably connected to the member A. The connection between the long arms and their respective quadrant members is of such nature that the arms will move with their members, but at the same time the arms may be adjusted to a limited extent on the members. This adjustable connection is secured by mak-

ing a segmental slot f in each quadrant member near the curved edge thereof and by a short bolt F' , which fits in the slot and has its threaded shank extended through the arm, the upper and outer extremity of said bolt having a thumb-nut f' , by which the bolt may be tightened to make the arm fast with the quadrant-plate.

The two quadrant-plates A B and the long arms C D of the dividers are pivotally connected together by a single bolt H, which is common to all of said parts and to the short arms E F of the dividers. Said pivotal bolt H passes through openings in the heels of the quadrant-plates, through slots provided in the short arms E F, and through holes c , formed in enlarged ends of the long arms C D, the extremities of said bolt H being provided with the tightening-nuts. Each long arm C D is made of a number of sections, (indicated at 1, 2, and 3,) two of which sections, 2 and 3, are rigidly joined together in a suitable way, the section 3, at the outer extremity of the long arm, being pointed, as usual. The section 1, at the pivoted end of the arm, is provided at an intermediate point of its length with the yoke 4, forming the opening or slot 5, and said section 1 is adjustably connected to the section 2 in a manner to compensate for wear on the points of the section and to enable both arms of the dividers to be kept of equal length. This adjustable connection between the sections 1 and 2 of the long arm is effected, preferably, by means of a screw-joint, in the preferred embodiment of which I make a screw-threaded tenon 6 on one section and provide a female-threaded socket on the adjacent end of the other section, whereby the tenon may be screwed into the socket to connect the parts rigidly together.

It will be seen that the quadrant members with the long arms adjustably and rigidly connected thereto may be opened or closed with the bolt H as a center and that in opening or closing the quadrant members the long arms move therewith and partake of the adjustment of such members. At the same time the long arms may be adjusted to a limited extent without affecting the quadrant members, because the short bolts F' may be loosened to permit the long arms to be adjusted on the bolt H within the limits of the segmental slots f . To hold the quadrant members and the long arms in their adjusted positions I provide a setting-bar I, which is combined with said plates and constructed in a novel manner to secure nicety of adjustment. This setting-bar I is arranged between the quadrant members and fitted in slots or openings provided in the straight radial edges, which slots or openings are formed between the plates by the abutting flanges at the heels and curved edges of said quadrant members. The setting-bar is provided in one edge with a series of spaced notches i , and the free end of the setting-bar passes through a loop or keeper I' , which is attached to the

quadrant member A near one of the side edges thereof, said notched edge of the setting-bar being adapted to engage with one of the legs of the keeper. The setting-bar is constructed at one end to provide a sleeve or lug i' , in which is formed an interiorly-threaded socket or hole through which passes an adjusting-screw I'' , which forms a part of the setting-bar, and by means of which the said bar may be lengthened or shortened, as required. This adjusting-screw I'' has a head i'' , by which the screw may be conveniently rotated, and in a collar of this head of the screw is formed an annular groove j , that fits in a smooth lug on a bracket-shaped plate J, the latter being arranged on the inner side of the quadrant member B and fastened thereto by means of a screw j' , which passes through said member B and works in a threaded hole in the bracket-plate J. It will be seen that the setting-bar lies between the quadrant members and that it has one end connected to one member A by having its notched edge fit in the keeper I' , while the other end of the setting-bar is attached to the other quadrant member B by having its adjusting-screw working loosely in the bracket J, attached to the member B. The head of the screw is exposed at one edge of the quadrant members, while the notched end of the setting-bar protrudes from the other edge of said members, so that the notched end of the setting-bar is accessible to the operator, who can readily adjust said setting-bar to free it from the keeper when it is desired to open the dividers by spreading the quadrant-plates and the long arms. To cause the setting-bar to engage with the keeper and to maintain the elements of the dividers in their adjusted positions, the setting-bar is normally pressed into engagement with its keeper by means of a pressure-spring J' , one end of which is fastened to the quadrant member A and the other end of which is engaged with the setting-bar in a manner to press the notched edge of said bar into engagement with the keeper.

The short arms E F of the dividers consist of elongated plates having pointed extremities, as at f^2 , and provided with longitudinal slots f^3 . The quadrant plate or member A at its heel is provided with a fixed guide m , in which is slidably fitted the short arm E, so that it may have a reciprocating play in the quadrant plate or member A and thus be extended or retracted therein. The other member or plate B is similarly provided with a guide m' , in which is slidably fitted the plate or shank of the other arm F, which likewise may be extended or retracted, as required. The short arms E F of the dividers are thus connected with the respective plates or members A B in a manner to partake of the swinging adjustment of the members or plates A B on the pivotal bolt H, and at the same time these short arms may be projected or retracted to or from the plates or members A B, as de-

sired, the said short arms E F being arranged centrally on the plates or members to bring their slots f^3 into position for the pivotal bolt H to pass through said slots. To provide for the convenient adjustment of the short arms in lines radial to the pivotal bolt H, I have provided the adjusting-screws N N', which have their headed ends n loosely journaled in the flanged edges a of the quadrant members A B, and which screws work in threaded openings provided in the inner closed ends n' of the slotted arms E F. The heads of the adjusting-screws are thus exposed outside of the quadrant plates or members and ready access is permitted thereto by forming the long arms with the yokes that provide openings through which the finger and thumb may easily be passed to grasp and adjust the screws. The extent of adjustment of the extensible short arms E F is accurately indicated on the quadrant plates or members by means of the scales o and the pointers O, the latter being attached to and movable with the short arms. The scales o are inscribed on plates o' , which are fastened to the quadrant-plates A B by screws or other suitable contrivances, and these plates are arranged alongside of the straight slots o^2 provided in said plates or members A B, through which slots pass the indicators or pointers O. Each pointer consists of a bent arm or plate having a pointed extremity arranged to move across the face of the scale-plate, and the heel of the pointer-arm is bent to abut against the short arm, to which it is attached by a screw or in any other suitable way. The pointer is thus adapted to indicate on the scale the adjustment of the short arm, because the pointer moves with said arm, and by employing the screws and the scales the user is able to accurately adjust the short arms of the dividers.

In using the instrument the setting-bar is disengaged from its keeper, and the plates or members A B, with the long and short arms attached thereto, are opened or spread to the required distance, after which the setting-bar is released to permit its spring to force one of the notches in engagement with the keeper, thus locking the dividers in their adjusted position. Accuracy of adjustment, however, is obtainable by manipulating the screw forming part of the setting-bar, thus providing for opening or closing the arms more or less, as may be required, after the setting-bar shall have been engaged with its keeper. The short arms E F of the dividers may be extended or retracted by adjusting the screws which control the short arms, and the long arms may be adjusted within the limits of the slots f by adjusting the bolts.

It will be seen that the pivotal bolt H affords a duplex center for the movement of the four arms at any angle or line desired. While the points of the short arms show the decimal parts of a foot, the long arms show one foot or any multiple of feet or degrees.

My geometrical dividers embraces the compass and the square.

The pointed extremities of the long and short arms of my dividers may be integral with the arms, or said pointed extremities may be made separate and adjustably fastened thereto by means of a set-screw, so as to compensate for wear.

A suitable geometrical scale Q is inscribed on one face of the plates or members of the instrument.

I am aware that changes in the form and proportion of parts and in the details of construction herein shown and described as the preferred embodiment of my invention may be made by a skilled mechanic without departing from the spirit or sacrificing the advantages of my invention, and I therefore reserve the right to make such modifications as fall within the scope of my invention.

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

1. In dividers, the combination of quadrant members, long arms thereon, and extensible short arms, substantially as and for the purposes described.

2. In dividers, the combination of quadrant members, a pivotal bolt, long arms fitted on said bolt and attached to said quadrant members, and extensible short arms carried by said quadrant members and fitted to said pivotal bolt, as and for the purposes described.

3. In dividers, the combination with quadrant members, of long arms occupying normally-fixed relation to said quadrant members and adjustable therewith, and extensible short arms slidably fitted to said quadrant members, substantially as and for the purposes described.

4. In dividers, the combination with quadrant members, of long arms each occupying normally a fixed relation to one of said quadrant members and capable of a limited adjustment thereon, and short arms slidably fitted to said quadrant members, substantially as and for the purposes described.

5. In dividers, the combination of quadrant members, a pivotal bolt which unites said members adjustably together, long arms fitted on said pivoted bolt and occupying normally-fixed relations to said quadrant members; short arms slidably fitted to the quadrant members and to the pivotal bolt to lie in axial alinement with the long arms, means for indicating the lateral adjustment of said quadrant members and the arms, and means for indicating the slidable adjustment of the short arms, substantially as and for the purposes described.

6. In dividers, the combination with pivoted quadrant members, and long arms movable therewith, of short arms slidably fitted to the respective quadrant members to occupy normal axial relation to said long arms on said members, and adjusting-screws each

mounted on one quadrant member and operatively connected with the short arm fitted thereto, for the purposes described, substantially as set forth.

5 7. In dividers, the combination of flanged quadrant members, a pivotal bolt, long and short arms mounted on the respective quadrant members, a setting-bar housed within
10 said flanged quadrant members, an adjusting-screw connected to one end of the setting-bar and to one of the quadrant members, and a keeper attached to the other quadrant member and normally engaged with the setting-bar, substantially as described.

15 8. The combination of pivoted quadrant members carrying the arms, a two-part setting-bar having seats in one member thereof and an adjusting threaded section which is loosely attached to one quadrant member, a
20 keeper on the other quadrant member engaging with the notched section of said setting-bar, and a spring to normally hold the setting-bar in engagement with the keeper, as and for the purposes described.

25 9. In dividers, the quadrant members provided with guides, and the short arms slidably fitted in said guides, combined with a pivotal bolt which passes through the members and said short arms, adjustable screws
30 connected to said short arms, and long arms carried by the quadrant members, as and for the purposes described.

35 10. In dividers, the combination with quadrant members having guides, of extensible short arms slidably fitted in said guides, pointers movable with said short arms and traversing scales on the quadrant members to denote the adjustment of the short arms, adjusting-screws connected to said short arms,
40 and long arms carried by said quadrant members, as and for the purposes described.

11. In dividers, the combination of quadrant members or plates pivoted together, extensible short arms carried by said quadrant members, and long arms pivoted on the connecting-bolt and fastened adjustably to said quadrant members, as and for the purposes described. 45

12. In dividers, the quadrant members or plates provided with the arc-shaped slots, combined with a pivotal bolt which connects
50 said members, long arms fitted on said bolt, the short bolts connected to said slotted quadrant members and to the long arms to fasten the latter adjustably on the members, and extensible short arms carried by the quadrant
55 members, as and for the purposes described.

13. In dividers, the combination of the quadrant plates or members, a pivotal bolt, extensible short arms carried by said plates or members, and the long arms pivoted on said bolt
60 and attached to said plates or members, each long arm being made in sections which at points beyond the pivotal bolt and the plates or members are adjustably connected together, as and for the purposes described. 65

14. A pair of dividers comprising the quadrant-shaped plates or members having a scale on their segmental edges, long arms attached to said plates, short arms slidably connected
70 to the plates, a single pivotal bolt which passes through the plates, the long arms, and the short arms, and a setting device connected at its respective ends to said plates or members, as and for the purposes described. 75

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

F. H. DE TRAY.

Witnesses:

B. AWERKAMP,
THEO. F. AWERKAMP.