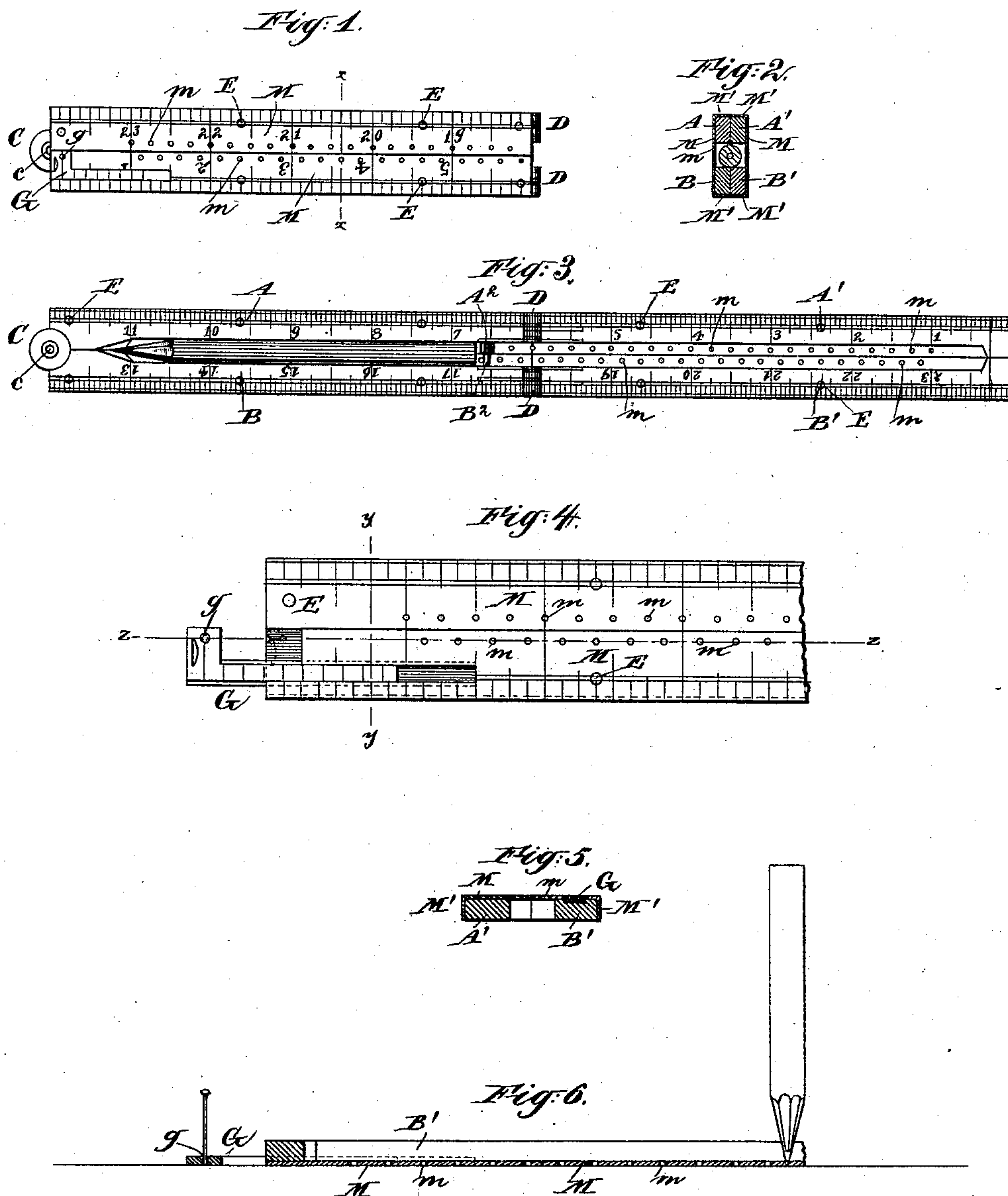


(No Model.)

A. RYAN.  
FOLDING RULE.

**No. 376,165.**

Patented Jan. 10, 1888.



Witnesses  
Charles P. Searle,  
H. A. Johnstone.

Inventor  
Andrew Ryan  
By his Attorney  
Thomas Drew Peterson

# UNITED STATES PATENT OFFICE.

ANDREW RYAN, OF NEW YORK, N. Y.

## FOLDING RULE.

SPECIFICATION forming part of Letters Patent No. 376,165, dated January 10, 1888.

Application filed March 22, 1887. Serial No. 231,913. (No model.)

*To all whom it may concern:*

Be it known that I, ANDREW RYAN, of the city and county of New York, in the State of New York, have invented a certain new and useful Improvement in Folding Rules, of which the following is a specification.

My invention combines the effect of a beam-compass with an ordinary folding rule. There have been previous attempts to attain this end. Mine avoids the objections thereto. My rule is eminently adapted to serve usefully in describing circles or arcs of considerable radii. The center is determined by a pin inserted through one hole, and the arc is described by a lead-pencil or other marking device inserted through another hole. I provide a series of holes accurately spaced, the holes on one of the folding parts being zigzag with those on the adjacent folding part. The holes are produced in a thin plate of metal, which is secured on that face of the rule which lies against the work. One edge is flanged upward and gives stiffness and finish. The wood is narrowed to allow the holes which are produced in one edge of each plate of metal to be made available. A slide is provided having a hole which can, by changing the position of the slide, be shifted outward or inward to any degree of fineness. By this means any intermediate radius may be obtained between those determined by the holes.

The following is a description of what I consider the best means of carrying out the invention.

The accompanying drawings form a part of this specification.

Figure 1 is a face view of the rule in the folded condition. Fig. 2 is a cross section on the line  $x x$  in Fig. 1. Fig. 3 is a face view of the rule in the open condition. The remaining figures are on a larger scale. Fig. 4 is a face view of a portion corresponding to Fig. 1, but with the slide partially extended. Fig. 5 is a cross-section on the line  $y y$  in Fig. 4. Fig. 6 is a longitudinal section on the line  $z z$  in Fig. 4, but with the rule turned over in condition for striking an arc.

Similar letters of reference indicate corresponding parts in all the figures where they occur.

A and A' are two parts of the wood. B and B' are corresponding two parts of the wood.

Each is faced with a plate of metal, M, having a flange, M', and a series of accurately-spaced holes,  $m$ , near the opposite edge. The wood A A' and B B' is narrower than the metal, so that access is easily obtained to insert a pin or pencil through any desired hole  $m$ .

C is a central rule-joint connecting the parts A and B. It is of the usual construction, except that the central pivot is drilled axially. The hole  $c$  thus produced may receive a pin to serve as a center. I esteem this the principal center.

D D are the hinges, which join respectively the parts A and A' and B and B'. They are formed as shown. The parts are firmly secured together by rivets E.

G is a slide working tightly and easily in a longitudinal channel produced in the part A'. This slide and the adjacent portion of the part A' are graduated vernierwise to facilitate the adjusting of the slide with accuracy to any desired extent outward. An arm on G carries a hole,  $g$ , which is in line with the series of holes  $m$ .

To use the rule a common pin may be inserted in the hole  $c$ , and a well-pointed pencil being inserted in a hole,  $m$ , at the proper distance from  $c$ , the rule with the connected pencil is moved, turning on the pin in  $c$  as a center, until a circle, or such part thereof as is desired, has been swept. The parts A A' carry holes  $m$  at even quarters of an inch. The parts B B' carry corresponding holes  $m$  in the intermediate positions. By inserting the pencil in one series or the other of the holes  $m$ —that is to say, in the holes which go with A A' or in the holes which go with B B'—the radius may be graduated to eighths of an inch.

When it is desired to sweep an arc having a radius intermediate between these positions, the slide G with its hole  $g$  becomes available by being moved out to the proper extent. Then, by inserting a pin in the hole  $g$  to serve as a center, a pencil in the proper hole  $m$  will describe the arc required.

I have made my experiments with a two-foot rule. By using  $c$  as the center I can describe arcs up to one-foot radius. By extending the rule and adjusting the slide G to serve as the center I can describe arcs up to two-foot radii. In the former condition, which will, I believe, be ordinarily preferred for



rough work, I can describe arcs the radii of which vary by eighths of an inch. By adjusting the slide G and using the hole *g* as a center I can describe an arc up to two-foot radius, and with any required radius within that range. The slide G should work with sufficient friction to allow it to serve as a center.

When my invention is applied to a rule which folds twice, as shown in Figs. 1, 2, 3, the pin B<sup>2</sup>, which projects from the part B, engages in a metallic socket, A<sup>2</sup>, fixed to the opposite part, A, and serves the functions of the corresponding pin and socket in ordinary folding rules to brace the parts and aid to maintain them in their proper positions when the rule is folded. The cavity which exists within this folded rule by virtue of the wood portions A B being narrower than the metal portions M serves as a convenient pocket in which to store a lead-pencil. It is guarded against escaping endwise from its pocket by the pin and socket A<sup>2</sup> B<sup>2</sup>. Any other long and slender article, as a pen-holder, may be thus inclosed in this pocket; but I esteem the pocket especially useful to inclose a pencil of proper hardness, well sharpened, and prepared for insertion in the proper hole to describe arcs with this rule. By keeping such a pencil in this pocket the pencil and the rule are always together, ready for instant service.

Modifications may be made in the details without departing from the principle or sacrificing the advantages of the invention. I can dispense with the hinges D and have the rule fold only at C. I can use the three joints shown on a shorter rule—as, for example, one foot folding into three inches. I can dispense with the flange on the metal, M. I prefer the whole, as shown.

Any of the holes of the series *m* may be used as the center, and any of the other holes of the series or the holes *c* or *g* may be used as the guide for the pencil.

I claim as my invention—

1. In a folding rule, the thin metallic parts M, having a series of holes, *m*, in combination with the bodies A B, narrower than M, arranged for joint operation relatively to each other and to a pivot-pin and marking device inserted in the holes, substantially as herein specified.

2. In a folding rule, the hollow pivot C *c*, in combination with the folding parts A B and thin metal portions M, having the zigzag holes *m*, all arranged as herein specified.

3. In a folding rule, the thin metallic parts M, having holes *m*, and the attached wood parts A B, &c., in combination with each other and with the slide G, carrying a hole, *g*, arranged to serve as herein specified.

4. In a folding rule, the narrow wood portions A A' B B' and wider metallic portions M, having holes *m*, combined and arranged, as shown, so as to serve the double functions of aiding to describe circles and parts of circles and of retaining in the folded condition a pencil suitably prepared for the service, all substantially as herein specified.

In testimony whereof I have hereunto set my hand, at New York city, this 11th day of March, 1887, in the presence of two subscribing witnesses.

ANDREW RYAN.

Witnesses:

WILLIAM DUDLEY,  
GEORGE B. DUDLEY.