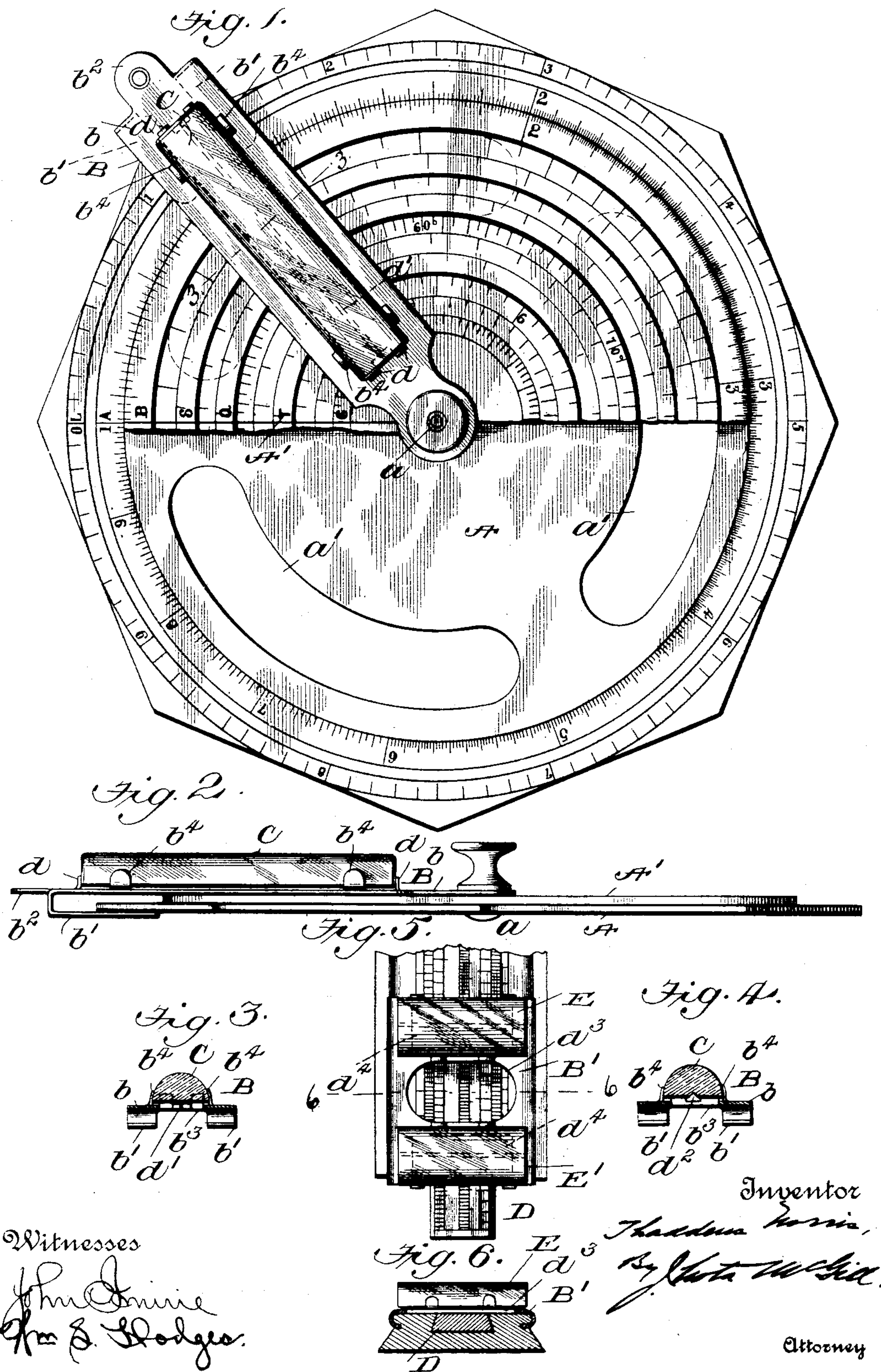


T. NORRIS.
MARKER FOR SLIDE RULES.

Patented May 28, 1895.



UNITED STATES PATENT OFFICE.

THADDEUS NORRIS, OF WASHINGTON, DISTRICT OF COLUMBIA.

MARKER FOR SLIDE-RULES.

SPECIFICATION forming part of Letters Patent No. 540,184, dated May 28, 1895.

Application filed October 24, 1894. Serial No. 526,880. (No model.)

To all whom it may concern:

Be it known that I, THADDEUS NORRIS, of Washington, in the District of Columbia, have invented certain new and useful Improvements in Slide-Rules; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention contemplates certain new and useful improvements in slide rules and relates particularly to those composed of two or more concentrically arranged disks pivoted together, but certain features of the improvements are, however, applicable to rules having longitudinally-movable members; also rules having verniers, and, in fact, can be used with all scales of graduation.

The objects of the invention are, first, to provide an improved simple and inexpensive marker or runner by which the scales or marks of graduation can be quickly and easily read, and, second, to enable the upper one of two movable concentric disks to be readily and easily grasped and turned independently of the lower disk. The first object I accomplish by securing direct to the marker or runner a semi or partially cylindrical lens which magnifies transversely, that is, the spaces between the division lines on the scale are magnified as are also the widths of such division lines, while the lengths of the latter are not perceptibly elongated. The lens is carried by the marker so as to be almost in direct contact with the rule. The second object is effected by providing the lower disk with one or more elongated openings to permit the upper or smaller disk to be grasped between the thumb and finger in order to turn it independently of the other disk thus permitting both disks to be manipulated by the fingers of one hand of the operator.

The invention will be hereinafter fully set forth and particularly pointed out in the claims.

In the accompanying drawings, Figure 1 is a plan view showing a portion of a circular slide-rule with my improved runner. Fig. 2 is a side view, parts being broken away. Fig. 3 is a transverse sectional view on the line 3 3, Fig. 1. Fig. 4 is a similar view of a slight modification. Fig. 5 is a plan view of a sec-

ond modification, parts being broken away. Fig. 6 is a transverse sectional view on the line 6 6, Fig. 5.

Referring to the drawings, A and A' designate two disks pivotally connected together at their centers by a headed rivet *a*. Upon these disks are circularly-arranged series of scales or divisional-lines which may be of any preferred plan or method and hence further reference thereto is not necessary. The under disk A is of greater diameter than the upper disk, and it is provided with one or more, preferably three, openings *a'*, which are elongated or curved concentrically with the upper disk. These openings allow the upper disk to be grasped between the thumb and finger, one touching the upper and the other the under side of said upper disk, whereby the latter can be turned to bring it in position for performing different calculations without moving the lower disk both disks being manipulated by the fingers of the hand of the operator in which the two disks are held.

B is the marker or runner, which comprises an approximately rectangular frame *b* pivoted at its inner end by rivet *a* and having at its outer end two inwardly bent fingers *b'* which hug or overlap the periphery of the disk A and serve as guides for the marker or runner. A lip or tongue *b²* projects from the outer end of this frame. The runner can be readily turned by grasping this lip or tongue. A longitudinal slot or opening *b³* is formed in the frame the same extending to within a short distance of each end thereof. From the parallel side-bars of this frame project opposite lips or flanges *b⁴*.

C is a lens of semi or partially cylindrical form in cross-section, that is, it is convex on its upper side and flat on its under side. This lens is fitted in frame *b* with its flat side down. It extends entirely over the slot in said frame and is held in place by the lips or flanges *b⁴*, which are bent inwardly against the opposite sides thereof. At its inner end this lens fits against two short lugs *d* which limit its inward movement. Extending longitudinally beneath the lens, from one end of the slot *b³* to the other, is a straight line *d'*, which serves as a guide and may consist of a wire or hair secured at its ends to perforated portions of the frame, or in lieu thereof, a groove or

scratch d^2 may be formed in the under or flat side of the lens, as shown in Fig. 4. When, however, my improved marker or runner is used in connection with a vernier and scale this guide-line is not necessary and hence may be omitted.

In Fig. 5 I have shown my improved marker or runner applied to an ordinary straight slide-rule D. The frame B' is made oblong and has a central opening d^3 and two end-slots d^4 . Over these slots are two lenses E and E'. The division-lines at the extreme ends of the rule are to be read through the outer lens E', while those in the center can be read through either lens. The sides of the runner may be bent or curved to overhang the grooved edges of the rule which serve as guides therefor. This form of marker or runner is for the purpose of securing a long bearing in order that the lens and the guide-line thereunder may remain perfectly perpendicular or at right angles to the rule when reading from scales at its extreme ends.

The advantages of my invention are apparent to those skilled in the art and it will be specially observed that by providing a marker or runner with a semi or partially cylindrical lens the division-lines and intermediate spaces are magnified transversely and but little if any longitudinally. Hence by attaching this lens directly to the marker the reading of a scale can be quickly and easily accomplished and by making the lower disk with curved openings the upper disk can be easily turned without moving the former.

It will be understood, of course, that I do not restrict myself to the use of my improved marker or runner in connection with slide rules of the character herein specified, as it may be employed to like advantage in reading scales on surveying, astronomical, and other instruments.

I claim as my invention—

1. A marker or runner for graduated scales

and the like having a slot or opening therein, a lens corresponding to but slightly larger than said slot or opening secured over the latter, said lens being of semi-cylindrical form and having a flat side provided with a central longitudinal groove forming a guide-line, substantially as set forth.

2. The herein-described improved slide-rule consisting of the two disks pivotally connected together at their centers, one of said disks being of greater diameter than the other and provided with a series of circularly arranged disconnected finger-slots, the marker or runner pivoted at its inner end to the center of said disks and having its outer end provided with fingers for overlapping the periphery of said larger disk, said marker or runner having a longitudinal opening therein, and a semi-cylindrical lens fitted directly over said longitudinal opening and having a lower flat side provided with a groove or recess, substantially as set forth.

3. The herein-described improved slide rule composed of two disks pivotally connected together, one of said disks being of greater diameter than the other and having a series of circularly arranged disconnected finger slots, a marker or runner pivoted at its inner end to the center of said disks and having its outer end overlapping the periphery of said large disk, said marker or runner having a longitudinal opening therein, a semi-cylindrical lens fitted over said opening and having a lower flat side, and a guide-line extending longitudinally beneath said lens from end to end thereof, substantially as set forth.

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

THADDEUS NORRIS.

Witnesses:

J. NOTA MCGILL,
WM. S. HODGES.