No. 776,340. PATENTED NOV. 29, 1904.

C. F. MOON.

INSTRUMENT FOR PLOTTING GEAR TEETH.

APPLICATION FILED MAY 4, 1904.

NO MODEL. 2 SHEETS—SHEET 1.

FIG. 1.

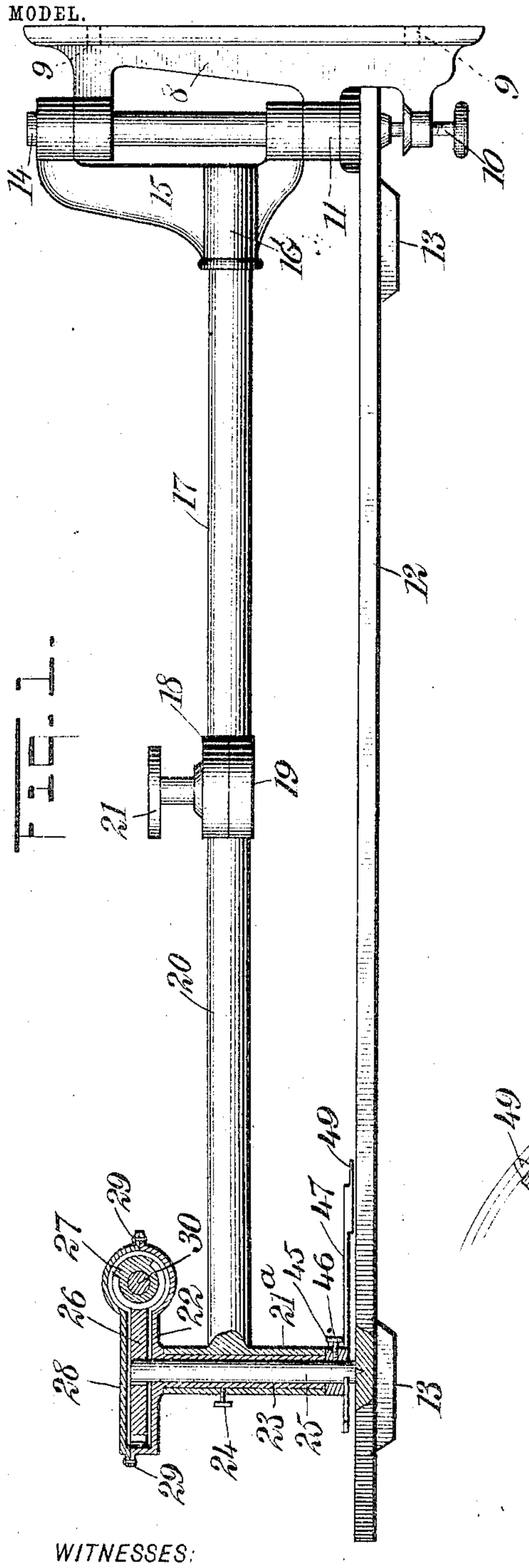
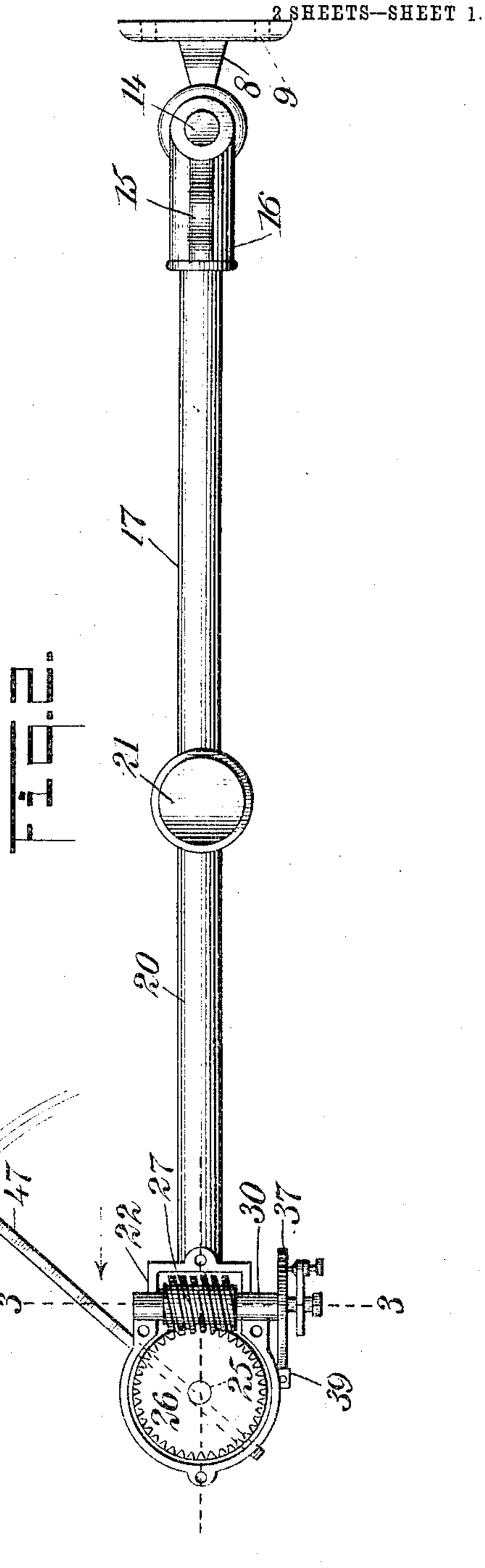


FIG. 2.



WITNESSES:

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Fig. 3.

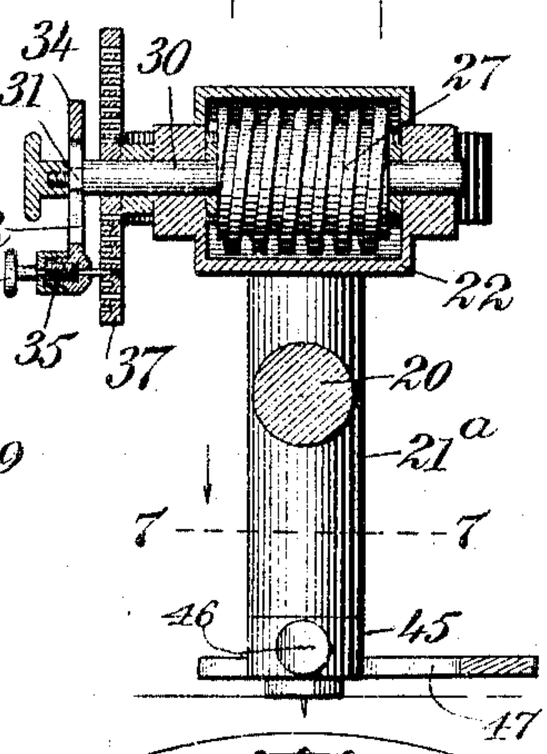
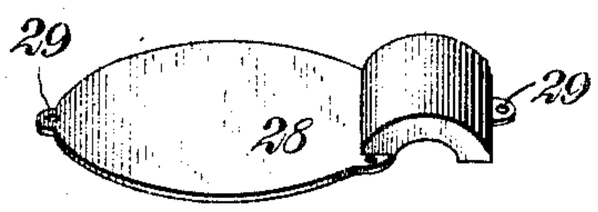


Fig. 6.



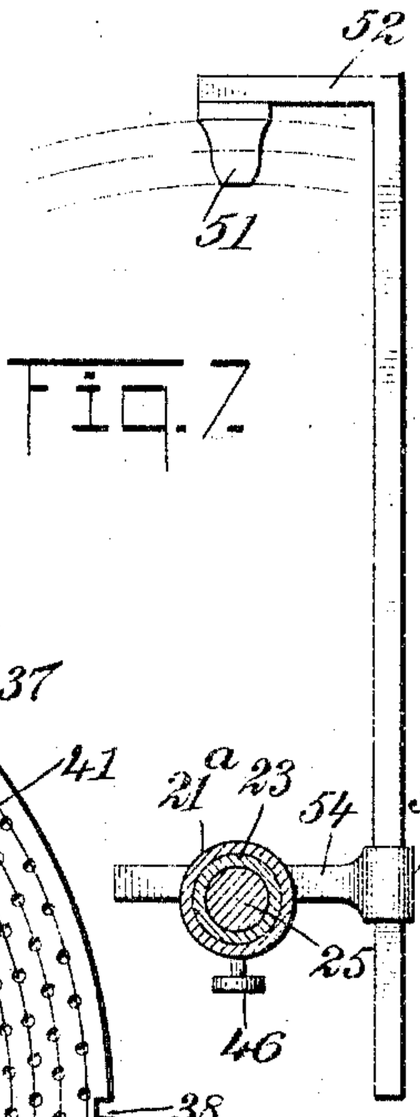


Fig. 7.

Fig. 4.

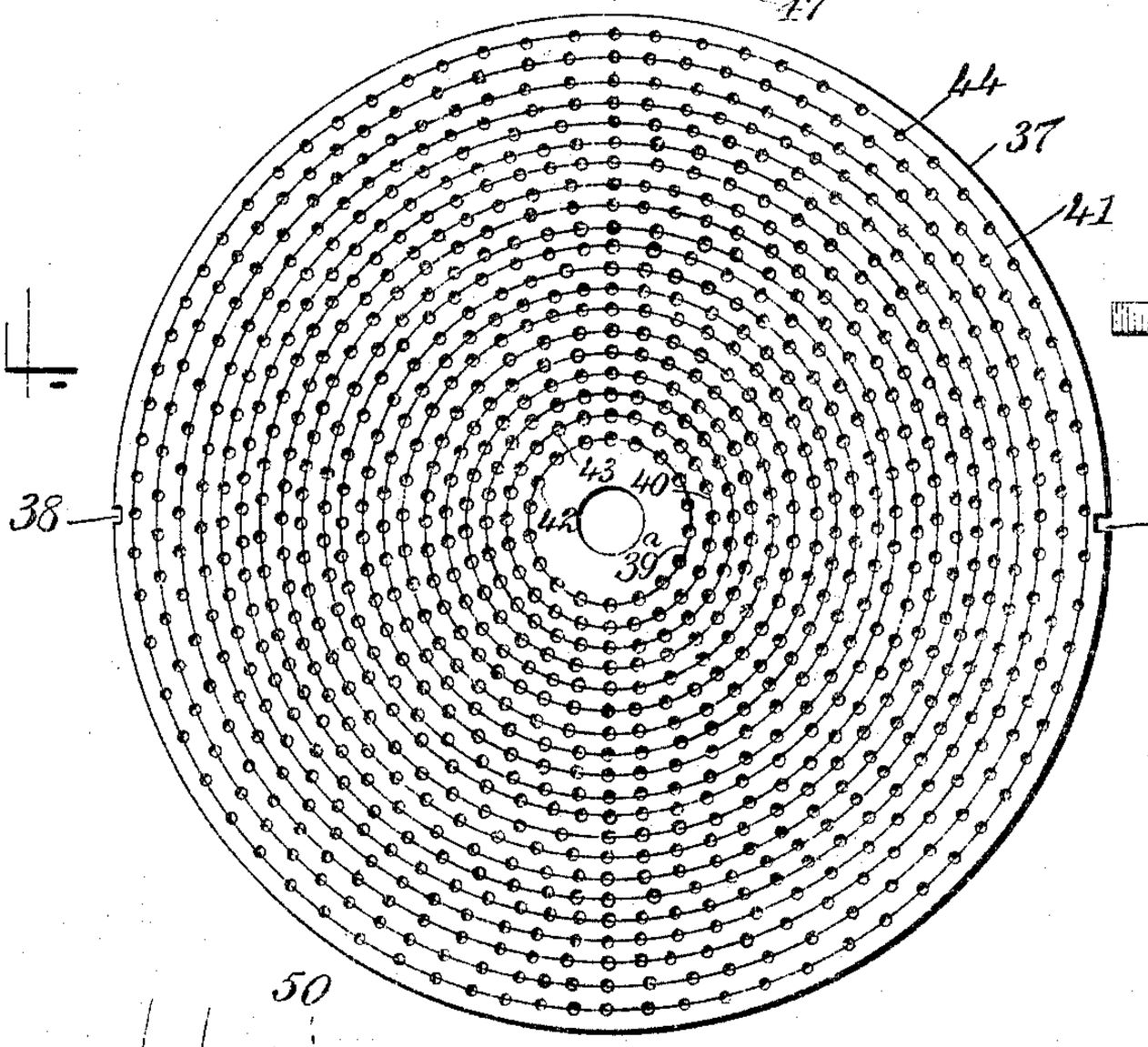


Fig. 5.

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No. 776,340. Patented November 29, 1904.

UNITED STATES PATENT OFFICE.

CLABORN F. MOON, OF GREENSBORO, NORTH CAROLINA, ASSIGNOR TO HIMSELF AND THOMAS J. McADOO, OF GREENSBORO, NORTH CAROLINA.

INSTRUMENT FOR PLOTTING GEAR-TEETH.

SPECIFICATION forming part of Letters Patent No. 776,340, dated November 29, 1904.

Application filed May 4, 1904. Serial No. 206,352. (No model.)

To all whom it may concern:

Be it known that I, CLABORN F. MOON, a citizen of the United States, and a resident of Greensboro, in the county of Guilford and State of North Carolina, have invented a new and Improved Instrument for Plotting Gear-Teeth, of which the following is a full, clear, and exact description.

My invention relates to instruments for plotting gear-teeth, whether external or internal, and to marking off circles into subdivisions of uniform size.

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

Figure 1 is a side elevation showing my invention ready for use. Fig. 2 is a plan view of the same, certain working parts being exposed to view. Fig. 3 is an enlarged fragmentary vertical section upon the line 3 3 of Fig. 2 looking in the direction of the arrow. Fig. 4 is an enlarged elevation of the index-disk. Fig. 5 represents both a plan and a side elevation of the arm carrying the tooth-form. Fig. 6 is a perspective view of the lid or cover 28; and Fig. 7 is a section upon the line 7 7 of Fig. 3, showing a different type of arm for carrying the tooth-form.

A bracket 8 is provided with holes 9, whereby it may be mounted upon a wall, and is further provided with a clamp 10 and shoulder 11, whereby it may be secured upon a drawing board or table 12. This board may also further be provided with lugs 13 for the purpose of engaging a flat surface, thus giving the board additional support. A pin 14 is rigidly connected with the bracket 8, and pivotally mounted upon this pin is a journal-yoke 15, provided with a sleeve 16, carrying a rod-section 17. This rod-section is provided with a flattened clamping member 18, which is engaged by a similar member 19, carried upon a rod-section 20. By means of a screw 21 the two clamping members may be gripped together as tightly as may be desired, so that the rod-sections 17 20 may be placed at any desired angle relatively to each other and when secured rigidly in this relative position will yet be free to swing upon the pin 14. The rod-section 20 carries a vertically-disposed sleeve 21^a, preferably integral therewith. A head 22 is provided with a sleeve 23, which fits loosely into the sleeve 21^a, but may be secured tightly in position with relation to the sleeve 21^a by means of a thumb-screw 24. By tightening or loosening this thumb-screw the head 22 may be turned to any desired angle. A central spindle 25 passes loosely through the sleeve 23 and is revoluble therein. A worm-gear 26 is keyed rigidly upon the spindle 25 and is engaged by a worm 27, as shown more particularly in Figs. 1 and 2. A cover 28 is provided with fastening members 29, whereby it is secured upon the head 22 for the purpose of protecting the working parts from dust. The worm 27 is mounted upon a spindle 30, this spindle being provided with a flattened portion 31, which engages a slot 32 in a crank-arm 34. This crank-arm is provided with a spring-plunger 35, controllable by a handle 36, whereby the plunger may be temporarily withdrawn a short distance in the direction in which the handle 36 is pulled. An index-disk 37 is provided with notches 38, disposed oppositely in the edge thereof and adapted to engage a lug 39, rigidly connected with the head 22. The disk 37 is stationary, but may be taken off and its position reversed, so that the spectator may behold either of its two flat faces, as desired. This disk is provided upon each of its faces with a large number of circles 39^a, 40, and 41, and each circle is provided with a series of holes 42, 43, and 44. Preferably all of the circles having an even number of holes are disposed upon one face of the disk and circles having an odd number of holes upon the opposite face thereof. The disposition of the holes and the circles is preferably such that the upper portion of the disk presents a row of holes disposed radially, as shown in Fig. 4. By pulling the handle 36 slightly outward or to the left, as will be seen in Fig. 3, the spring-plunger 35 may be withdrawn from any hole it may chance to occupy in the disk

37, and upon being thus detached the crank-arm may be rotated within any desired limits relative to the disk 37 and secured in position by allowing the spring-plunger 35 to enter any desired hole. The crank-arm 34 being fitted slidably upon the flattened portion 31 of the spindle 30, the spring-plunger may be moved toward or from the center of the index-disk, and thus brought to any desired circle. The gearing of the worm 27 and of the worm-wheel 26 is such that forty turns of the crank-arm 34 correspond to one turn of the worm-wheel 26 and spindle 25.

Mounted upon the lower end of the spindle 25 is a ring 45, secured thereto by means of a thumb-screw 46. An arm 47 passes tangentially through a slot in the spindle 25 and through an opening in the ring 45, as indicated in Fig. 1. This arm is provided at its outer or free end with a slot 48, whereby it is bifurcated, as shown in Fig. 5. A tooth-form 49 is integrally mounted upon a plate 50, which engages the outer or free end of the arm 47, the latter being recessed for the purpose. The plate 50 is sprung into position, so as to support the tooth-form, as indicated in Fig. 5, the slot 48 permitting this action. The arm 47 and the tooth-form 49 are of the kind used for cutting so-called "external gear-teeth." For cutting internal gear-teeth, however, I prefer to use the type of device shown in Fig. 7. In this view the tooth-form 51 is mounted upon an L-shaped arm 52, which fits into a sleeve 53, integrally mounted upon a rod 54, this rod being adjustable longitudinally in relation to the ring 45, as shown more particularly in Fig. 7. In other words, I merely pull out the arm 47 and insert instead the comparatively short rod or arm 54. It will be noted that the arms 47 and 52 are so arranged that the center of the tooth-forms 49 or 51 is exactly in line with the center of the spindle 25, as will be seen by inspecting Figs. 2 and 7.

My invention is used as follows: The board 12 being arranged as shown in Fig. 1, the spindle 25 is mounted at a point representing the center of the wheel, the teeth of which are to be plotted. If this wheel is to be provided with externally-disposed teeth, the arm 47 is inserted through the ring 45 and spindle 25 and so adjusted as to give the wheel the desired radius. The proper tooth-form 49 now being placed in position, the device is ready for use. Each time the spring-plunger 35 is inserted in a hole the tooth-form 49 is necessarily secured in proper position to serve as a templet for tracing the tooth. The operator merely runs his pencil around the tooth-form, following its contour and marking its correct position upon the paper used for plotting. If now one turn of the crank-arm 34 represents one-fortieth of the turn of the arm 47 or 52, it follows, of course, that if the gear is to be provided with forty teeth the crank is turned forty times and the spring-plunger is brought around to the same hole forty times, so that the tooth is moved step by step around a circle representing the circumference of the wheel to be plotted. If, however, the wheel to be made is to have any other number of teeth—such, for instance, as thirty-nine—the crank-arm is moved around, as above described, but is carried a little beyond the starting-point, and the spring-plunger is inserted in the next consecutive hole when cooperating with the circle having thirty-nine holes. For instance, if, as is usually done, the operator begins his reckoning from a predetermined hole in the upper portion of the disk, he turns the crank around, say, to the right, a little more than one complete revolution until the plunger comes opposite the next consecutive hole to the right of the one selected, thus moving the templet an angular distance representing the distance between two consecutive teeth to be formed. The tooth is now indicated by running a pencil around the templet or tooth-form and the crank-arm moved around again a little more than a complete revolution, stopping at the next consecutive hole a little farther to the right from the starting-point, and so on until the entire series is completed. It follows, therefore, that the teeth must be spaced equidistant and that the tooth-form is held rigidly in position and with mathametical accuracy. By selecting the appropriate circle having the proper number of holes almost any conceivable variation can be made in the number of teeth to be plotted for a wheel. For instance, as the inner circle 39^a contains eighteen holes it is obvious that if the plunger be stopped at a point one, two, or three holes removed from the starting-point and after completing the revolution the teeth will be spaced farther apart than if the outer circle 41, containing seventy-two teeth, be selected and the instrument manipulated in the same manner. If desired, the plunger can be moved around, as above described, and stopped at distances representing two, three, or any desired number of holes removed from the starting-point and from each other.

This instrument admits of general use, but is of peculiar value to architects, engineers, draftsmen, pattern-makers, and all other persons who may from any cause desire to divide circles or portions thereof into portions separated by radially-disposed lines. It admits, therefore, of quite a variety of uses. Its simplicity is such that it can be operated by any person of ordinary intelligence.

The spacing-head may be used for supporting a lamp or holding drawing instruments, which may rest upon the flat upper surface of the cover 28.

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

1. In an instrument for plotting gear-teeth,

the combination of a revoluble spindle, means for securing the same in predetermined definite positions, a comparatively short rod connected with said spindle and provided with a sleeve, and an L-shaped arm engaging said sleeve and having a tooth-form mounted therein.

2. In an instrument for plotting gear-teeth, the combination of a jointed rod provided with a head, gearing supported by said head, means controllable at will for actuating said gearing, mechanism for indicating the amount of actuation thereof, means connected with said last-mentioned mechanism and adapted to be moved into different angular positions, said means supporting a movable tooth-form, and means for supporting said jointed rod.

3. In an instrument for plotting gear-teeth, the combination of a member admitting of angular movement into different positions relatively to a common center, a head mounted upon said member and provided with a flat upper surface capable of use as a support for a lamp, a templet, and mechanism connected with said head for actuating said templet.

4. In an instrument for plotting gear-teeth, the combination of a disk having oppositely-disposed faces provided with holes, said disk being reversible so as to present either of said faces toward the operator, a manually-operated member movable angularly with reference to said disk and provided with mechanism for engaging said holes, gear members connected with said manually-operated member and controllable thereby, an arm connected with one of said gear members and adapted to move angularly into different positions, and a tooth-form mounted upon the outer or free end of said radially-disposed arm.

5. In an instrument for plotting gear-teeth, the combination of a jointed rod provided with a head, means for temporarily securing said head in a predetermined fixed position, gearing supported by said head, means for actuating said gearing, mechanism for indicating the amount of actuation thereof, and means for revolubly supporting a movable tooth-form, said means being controlled by said gearing.

6. The combination of a disk having oppositely-disposed faces provided with holes, said disk being reversible so as to present either of said faces toward the operator, a manually-operated member movable angularly in relation to said disk and provided with mechanism for engaging said holes in either of said faces according to the position of said disk, gearing connected with said manually-operated member and actuated thereby, and a templet controllable by said gearing for the purpose of disclosing the position of a tooth to be formed.

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

CLABORN F. MOON.

Witnesses:
JNO. K. MCILHENNY, Jr.,
HARRY N. LATHAM.