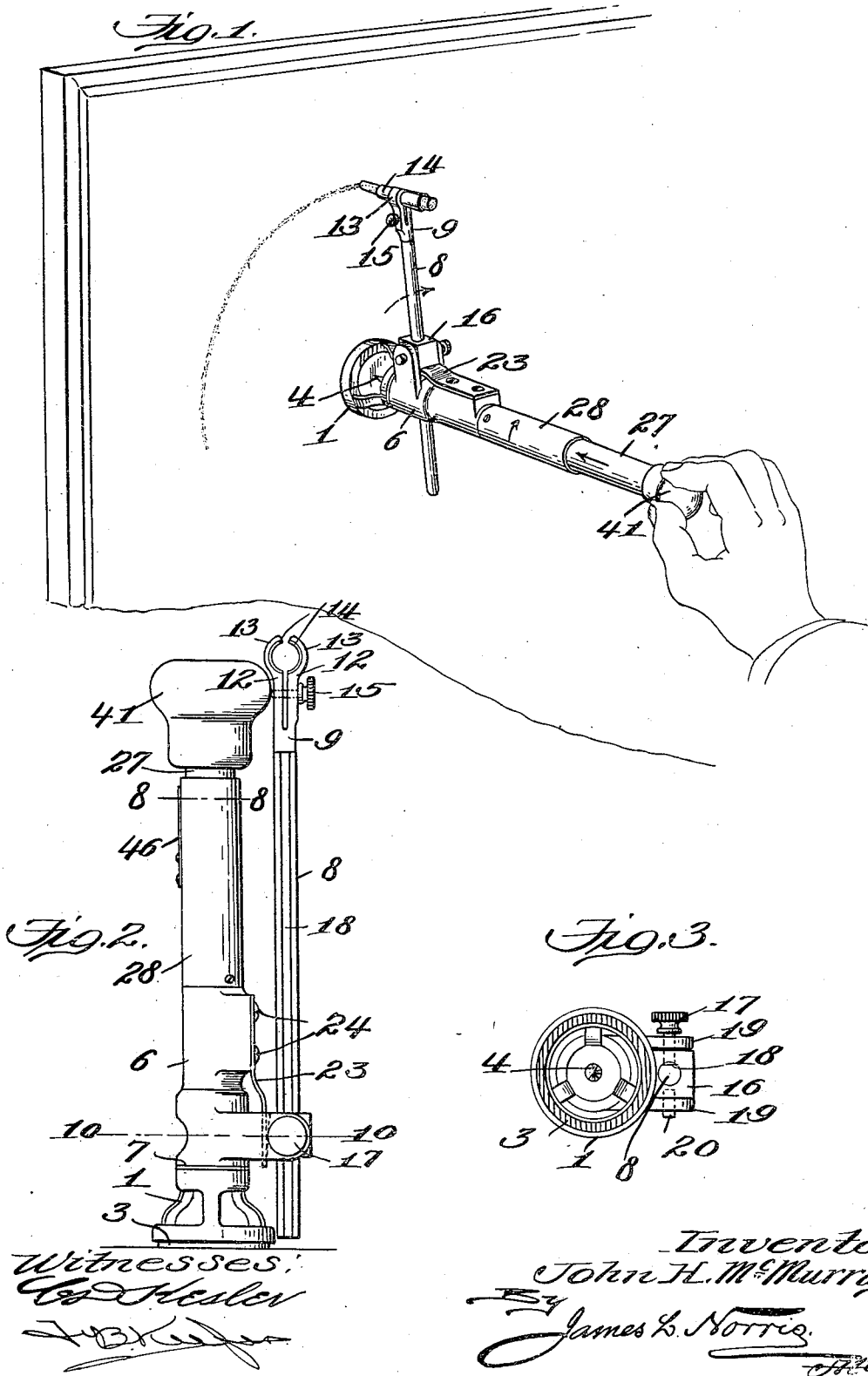


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 INSTRUMENT FOR DRAWING CIRCLES.
 APPLICATION FILED MAR. 24, 1909.

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Patented Mar. 8, 1910.

2 SHEETS—SHEET 1.

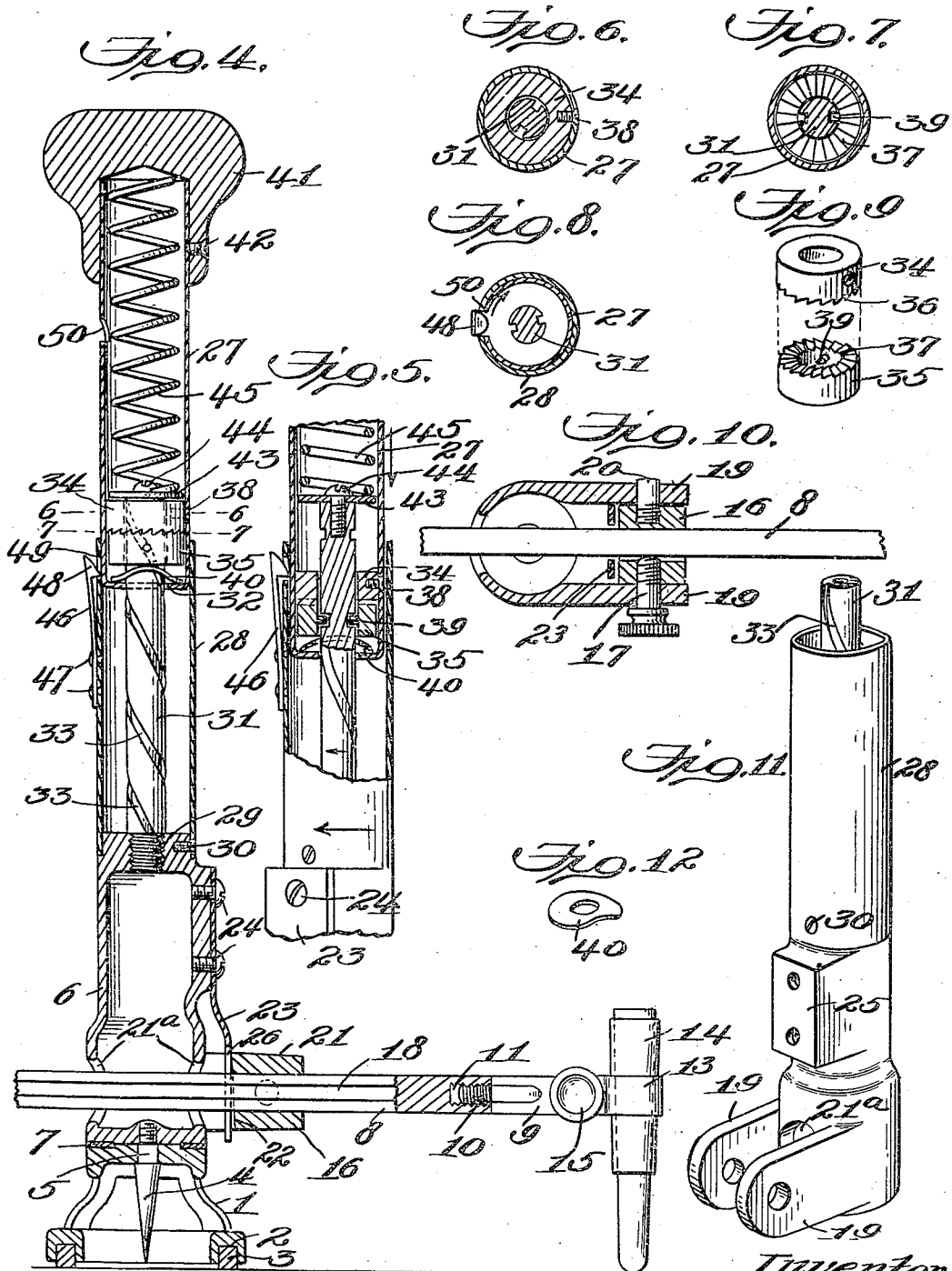


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2 SHEETS—SHEET 2.



Witnesses:
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UNITED STATES PATENT OFFICE.

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INSTRUMENT FOR DRAWING CIRCLES.

951,255.

Specification of Letters Patent.

Patented Mar. 8, 1910.

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To all whom it may concern:

Be it known that I, JOHN H. McMURRAY, a citizen of the United States, residing at Schenectady, in the county of Schenectady and State of New York, have invented new and useful Improvements in Instruments for Drawing Circles, of which the following is a specification.

This invention relates to new and useful improvements in instruments for drawing circles and it has more particular reference to an instrument in the nature of a beam compass, especially applicable for school work in drawing circles and geometrical figures upon a blackboard but also advantageously applicable for general drafting purposes.

The primary object of the invention is to provide an instrument for drawing circles, which may be manipulated with one hand and in such manner that the scribing point bears upon the plane surface to be marked, with a uniform degree of pressure at all times. The arrangement is such that an arc may be drawn with equal facility, at any desired position upon the blackboard or paper.

The particular means by which the above objects are attained comprises a motion converting device, in which rotatable prime movers or actuating knobs are dispensed with, the motion converting device being operated by a non-rotatable element which is given an axial thrust. In this manner the line of force is always coincident with the center of the circle and it is thereby assured that the arc described shall be absolutely true, even and unbroken. I consider this a radical advance in the art of cyclographs for, in so far as I am aware, no circle scribing instruments have ever been operated in this manner. It is true that the ordinary draftsman's compass may be manipulated with one hand. This compass cannot be used, however, in scribing large circles and even in connection with small circles, it can only be used efficiently by one skilled in drafting and who, by reason of experience, has acquired the manual dexterity or "knack" of properly handling the instrument, in order to produce a circle of uniform diameter and evenness. The draftsman's compass is not a practical instrument to put into the hands of a person not skilled in the work. It is also true that beam compasses

have been designed which it is proposed to manipulate with one hand. Such devices are, however, clumsy and hard to handle and a certain degree of dexterity and familiarity with these instruments is necessary to obtain good results. Even then their clumsiness renders their use impractical and offsets any good qualities which might otherwise be claimed for them.

The present invention is absolutely mechanical in its action and does not require the slightest degree of skill or knowledge for its efficient use. Aside from this, it may be manipulated with marvelous rapidity, the circles drawn being absolutely true and finished, and the line work even. While these considerations give the invention an important footing in the field of general drafting, they render it especially applicable for blackboard work. Ordinarily in scribing circles on blackboards, a crayon is attached at one end of a cord and the other end of the cord is held at the center of the circle to be drawn. Grasping the crayon, tension is put upon the cord and the crayon is moved to describe an arc about the other end of the cord as a center. This method is undesirable for many reasons. In the first place, the circle cannot be drawn in a single movement of the crayon as it has to be lifted to pass the user's forearm. Furthermore, it is difficult or impractical to scribe circles beyond a diameter of approximately three feet. Then, again, the cord usually stretches and the circle scribed is not true. And finally, the user's hands are marked with the piece of chalk which is employed. In the use of the present device, the circle is scribed without taking the chalk from the board. Only one hand is used to manipulate the device, the other hand being free to manipulate a pointer. The operator's attention is not required other than to give the operating element the necessary axial thrust. The limit of the diameters of the circles which may be drawn is determined only by the length of the beam. An arc of any degree desired may be drawn with minute accuracy. Circles may be drawn as rapidly as the position of the device may be changed. And finally, it is not necessary to the operation for the user to grasp the chalk.

The invention aims also to provide a device which shall be compact and which embodies a pivoted beam that may be swung

and supported out of the way when not in use. In this manner, the device may be put in a drawer of a desk, occupying but small compass.

5 The invention while efficiently attaining the objects stated, retains also the incidents of simplicity of details, inexpensiveness, durability and practicability.

In the accompanying drawings, I have
10 illustrated a preferred and advantageous embodiment of the invention. The structural details of such embodiment are set forth at length in the following description in which the above and various other ob-
15 jects and features of novelty are made to appear, while the novel scope of the invention is indicated in the claims appended at the end of the description.

In the said drawings: Figure 1 is a perspective view illustrating the manner of use
20 of an instrument constructed in accordance with the present invention. Fig. 2 is a side elevation of such an instrument, the beam being shown in its folded relation. Fig. 3
25 is a bottom plan view of the instrument, the beam being folded. Fig. 4 is a central vertical sectional view of the instrument, the parts being shown as before an active operation thereof and the beam being in its extended position. Fig. 5 is a fragmentary
30 central vertical sectional view illustrating the relations of the parts during an operation of the instrument. Fig. 6 is a section on the line 6—6 of Fig. 4. Fig. 7 is a section
35 on the line 7—7 of Fig. 4. Fig. 8 is a cross sectional view showing the manner of locking the relatively slidable barrels comprehended in the invention. Fig. 9 is a perspective detail of two cooperating clutch
40 members comprehended in the invention. Fig. 10 is a section on the line 10—10 of Fig. 2, the beam being extended. Fig. 11 is a perspective view of the rotatable barrel and its adjuncts, and Fig. 12 is a perspective detail
45 of a spring device for maintaining the operative relation of the clutch members.

Similar characters of reference refer to corresponding parts throughout the several views.

50 The operating elements of the instrument are assembled with respect to a skeleton base, as 1, having in its under face an annular groove, as 2, in which is confined a ring 3, preferably of rubber, the ring 3 projecting
55 slightly beyond the under face of the base 1 and serving to bear with friction against the plane surface upon which the circle is to be drawn. The base 1 is placed at the center of the circle, such center being determined
60 by a pointer, as 4, which is disposed within the confines of the base and which has an extended shank, as 5, which is employed as a connector for the rotatable element of the compass structure, to assemble such rotatable
65 element upon the base. The rotatable

element comprises a casting, as 6, which is of substantially cylindrical form and the shank 5 is threaded centrally into the bottom wall of said casting, between which and the top wall of the base 1 a bearing washer,
70 as 7, is interposed. In this connection it should be noted that the words "top", "bottom", "vertical" and "horizontal", as used throughout this description, are not absolute but are simply used for convenience to
75 designate the relations of the parts as they appear in Figs. 2, 4, 5 and 11, and that an element which is herein described as vertical may, in the practical use of the instrument, be horizontal, and vice versa.

80 The compass proper comprises a horizontal beam, as 8, which projects radially from the casting 6 and to the end of which is attached a chalk holding device, as 9, which forms in effect an axial extension of the
85 beam 8. The device 9 is removably attached to the beam 8 in order to permit of its assemblage upon beams of different lengths and is accordingly provided with an axially projecting threaded stem, as 10, which en-
90 gages in a threaded recess, as 11, provided in the end of the beam 8. The chalk holder 9 comprises a shank which is split centrally and longitudinally for a portion of its length to afford a pair of outwardly springing re-
95 silient clamping jaws, as 12, each having a bow-shaped end portion, as 13, to which is secured a tapered half sleeve, as 14. The half sleeves 14 constitute the chalk holder proper and are tightly clamped upon the
100 piece of crayon in the manner shown in Figs. 1 and 4 by means of a binding screw, as 15, of well known form, which is employed to draw the arms 12 together or to permit them to spread apart.

105 The beam 8 is carried upon a center block, as 16, the arrangement of which is shown more particularly in Figs. 4 and 10. The block 16 has a central opening through which the beam 8 projects and the latter may
110 be adjusted axially to different positions so as to vary the length of the chalk carrying portion thereof, a screw, as 17, being threaded through one side of the block 16 and frictionally engaging the adjacent side of
115 the beam 8 to hold the same in any position at which it may be set. The beam 8 has one of its sides flattened, as at 18, (see Figs. 3 and 4) to provide sufficient bearing surface for the screw 17. The block 16 is pivotally
120 mounted between a pair of parallel radially projecting ears, as 19, which are formed upon the lower portion of the casting 6, the screw 17 constituting a pivotal journal for the block 16 at one side thereof and a jour-
125 nal, as 20, being provided at the other side of said block and having threaded engagement in a recess formed therein. The casting 6 is formed with alined openings, as 21, through which the adjacent end portion of 130

the beam 8 projects in the extended position of said beam. The block 16 is of flat sided formation, and its upper face 21 and its inner face 22 extend from the respective front and lower faces of the blocks at obtuse angles. The faces 21 and 22 are inclined in the manner set forth in order that they may efficiently cooperate with a leaf spring, as 23, which is employed to hold the beam 8 firmly in either its extended or its folded position. The spring 23 is secured by screws, as 24, to a flat faced saddle portion, as 25, which is formed upon the casting 6. The spring 23 has an offset depending portion, as 26, which is bifurcated and which straddles the beam 8 between the block 16 and the casting 6. The free projecting portion 26 of said spring bears against the upper portion of the face 22 so that the crayon is forced firmly into contact with the blackboard when the beam is in its extended position, as shown more particularly in Fig. 4. When the beam is in its folded position, however, as shown more particularly in Fig. 2, the end 26 of the spring 23 bears against the lower portion of the face 21 of the block 16 and thereby efficiently holds the beam 8 in a position parallel to the axis of the casting 6.

As above intimated, the casting 6 is rotatable and its relation to the compass structure proper having been set forth, there remains to be described its relation to the operating mechanism of the instrument. Such operating mechanism comprises essentially a slidable barrel, as 27, which is non-rotatable and a rotatable barrel, as 28, which is non-slidable. The latter surrounds the barrel 27 and it also surrounds an axially extended boss, as 29, on the upper face of the casting 6, being fixed to said boss by a screw 30. Centrally arranged within the barrel 28 is a stem, as 31, which at its lower end, has threaded connection with the boss 29 and which has its upper end portion projecting centrally and axially into the barrel 27, the latter having at its lower end an intumed flange, as 32, which loosely surrounds the stem 31. The stem 31 is formed with two diametrically opposite spiral grooves, as 33, which have a comparatively deep pitch.

The barrel 27 is provided with means for cooperation with the stem 31 in such manner that when said barrel is given an axial inward thrust, the stem 31 and the casting 6 connected thereto will be caused to rotate. Such means comprise a pair of cooperating annular members 34 and 35 having respective opposed clutch faces 36 and 37. The member 34 is fixed within the barrel 27 by a screw, as 38, and loosely surrounds the stem 31, while the member 35 is loosely mounted within the barrel 27 and is formed with opposite pins or lugs, as 39, which are disposed in a central bore and which engage

in the respective grooves 33. The member 35 is maintained in position to interlockingly engage its teeth 37 with the teeth 36 of the member 34, by a suitable spring device, which in the present instance is preferably a spring washer of meniscus form, as 40, which is shown more particularly in Figs. 4 and 12 and which is supported on the flange 32 and in turn yieldably supports the member 35.

The barrel 27 carries at its upper end a suitable hand grip or knob, as 41, which is fixed to said barrel by a screw 42 and by means of which the instrument may be conveniently operated. The stem 31 carries upon its upper end a disk, as 43, which is fixed by a screw 44 and which serves as a stop to limit the upward movement of the barrel 27, in such use being engaged by the member 34. The disk 43 also serves as the lower seat of an expansive coil spring, as 45, which is employed to restore the parts to their normal positions after each operation of the instrument and which is confined in the barrel 27, seating against the disk 43, as stated, and also against the handle 41 which, in the operation of the device, moves toward and away from said disk and consequently compresses the spring 45 and stores power therein upon its inward movement and when released is in turn forced by said spring outwardly. It is preferred that the stem 31 shall be constructed with two oppositely located spiral grooves of equal pitch and that the member 35 shall be constructed with two oppositely located lugs, as 39, for engagement with said grooves, in order that said member may be perfectly balanced at all times and any tilting or play thereof consequently avoided.

In order that the device may be packed away in a small space when it is not in use, in addition to the pivoted mounting of the beam 8 above described, and which allows of said beam being moved to the folded position of Fig. 2, means are also provided for holding the barrel 27 for the most part within the barrel 28, as also shown in Fig. 2, and such means preferably comprises a spring catch, as 46, which has its lower end portion secured to the barrel 28 by rivets or other fastenings 47 and which has its upper end portion free and provided with a pointed tooth, as 48. The tooth 48 is arranged to project through an opening, as 49, in the barrel 28 and also through an opening, as 50, in the barrel 27 when the latter is so positioned that the opening 50 registers with the opening 49, as is shown in Fig. 8 and as clearly suggested in Fig. 2. It has been stated that the barrel 27 is non-rotatable. This is true in so far as the necessity for rotation is concerned during the operation or use of the instrument. However, it is obvious that the barrel 27 may be rotated in

a direction opposite to the direction of the rotation of the casting 6, in which case the member 35 will yield to allow the teeth 36 and 37 to ride over one another. The barrel 27 is never rotated, however, in the manner described except when it is desired to disengage the spring catch 46 and in such case, the barrel 27 is given a slight partial rotation in the manner indicated, during which the side wall of the opening 50 will engage the tooth 48 and by virtue of the pointed formation of said tooth, ride over the same, thereby freeing the barrel 27 and permitting of its movement to the position shown in Fig. 4, in which the tooth 48 bears against the imperforate side of the barrel 27.

In folding the beam 8, the screw 17 is loosened and the beam is moved outwardly until its end is flush with the end face of the block 16. The screw 17 is then tightened and the beam is swung into the vertical position shown in Fig. 2, being efficiently held in position by the spring 23, in the manner explained.

The manner in which the invention is used and the consequent advantages thereof have been referred to at some length in the introductory paragraphs of the specification and will be appreciated by an inspection of Fig. 1, in which it will be seen that the operator in using the instrument places the base 1 upon the plane surface to be marked, which, in Fig. 1, is shown as a blackboard, and then thrusts the sleeve 27 inwardly, thus causing rotation of the casting 6 in the manner described whereby the crayon describes a circle about the pointer 4 as a center. The scribing operation is accomplished without taking the crayon from the board and the crayon bears at all times with equal pressure upon the board, owing to the provision of the spring 23 which acts in the manner stated and to the further fact that the line of force by which the instrument is operated is coincident with the central pointer 4. The line of work is thus even and the circle described is absolutely true and finished. Furthermore, a circle may be scribed with marvelous rapidity, it being simply necessary to position the device and to thrust the barrel 27 inwardly. It may be said that the circle scribing operation is automatic, since, aside from the manual operation of the prime mover, in this instance the barrel 27, the control of the rotatable casting 6 is absolutely mechanical and the scribing operation may be accomplished just as well by an unskilled person as by one who has great manual dexterity.

The invention in part is not limited to the form herein disclosed and such form is to be regarded simply as an example of a preferred and advantageous construction.

Having fully described my invention, I claim:

1. An instrument for drawing circles comprising a base, a member rotatable thereon, a beam carried by said member and in turn carrying a scribing point, an axially movable operating element and means for converting the axial movement of said element into rotatory movement of said member.

2. An instrument for drawing circles comprising the combination with centering means and circle scribing means, of means operable by pressure directed toward the centering means for simultaneously holding the centering means upon the surface to be marked and for automatically producing the circle scribing operation of the scribing means.

3. An instrument for drawing circles comprising a base, a member rotatable thereon, a beam carried by said member and in turn carrying a scribing point, spring means for causing the scribing point to bear upon the surface to be marked and means independent of said spring means for rotating said member and comprising an axially movable operating element and means for converting the axial movement of said element into rotatory movement of said member.

4. An instrument for drawing circles comprising a base, a member rotatable thereon, a flat sided center block pivoted horizontally at one side of the member, a radially projecting beam carried by the center block, a scribing point carried by the beam and a flat spring secured to the member and arranged to bear upon the flat sides of the center block.

5. An instrument for drawing circles comprising a base, a member rotatable thereon, a center block pivoted horizontally at one side of the member and having flat faces meeting one another at an acute angle, a radially projecting beam carried by the center block, a scribing point carried by the beam and a flat spring secured to the member and having a depending free portion arranged to bear upon the flat sides of the center block.

6. An instrument for drawing circles comprising a base, a member rotatable thereon and having alined openings, a center block pivoted horizontally at one side of the member and having an opening alining with the openings in the member, a radially projecting beam passed through the openings in the center block and in the member, a scribing point carried by the beam, the beam being radially adjustable, a screw engaging the beam to hold the same at selected positions, and means acting on the center block to hold the same in either of two positions on its pivot.

7. An instrument for drawing circles com-

prising a base, a member rotatable thereon and having alined openings, a flat sided center block pivoted horizontally at one side of the member and having an opening alin-
 5 ing with the openings in the member, a radially projecting beam passed through the openings in the center block and in the member, a scribing point carried by the beam, the beam being radially adjustable, a
 10 screw engaging the beam to hold the same at selected positions, and a flat spring secured to the member and having a portion straddling the beam and bearing on the center block.

15 8. An instrument for drawing circles comprising a base, a member rotatable thereon, a beam carried by said member and in turn carrying a scribing point, an axially movable operating element, means for convert-
 20 ing the axial movement of said element into rotatory movement of said member, and means for locking said element at its innermost position.

25 9. An instrument for drawing circles comprising a base, a member rotatable thereon and provided with an axially extended sleeve, a beam carried by said member and in turn carrying a scribing point, an axially
 30 movable operating element comprising a sleeve concentric to the first named sleeve, means for converting the axial movement of the operating element into rotatory movement of the member, the sleeves having openings
 35 which may be alined when the axially movable sleeve is in its innermost position and means for locking the axially movable sleeve in its innermost position comprising a spring catch secured to one of said sleeves and
 40 having a tooth which projects through said openings in their alined relation.

10. An instrument for drawing circles comprising a base, a member rotatable thereon, a beam carried by said member and in

turn carrying a scribing point, an axially projecting stem carried by said member and
 45 having a spiral groove, a sleeve having an intumed lower end portion surrounding said stem, a disk secured upon the upper end of the stem, a knob secured upon the upper end of the sleeve, an expansive coil spring con-
 50 fined in the sleeve between the disk and the knob, a pair of annular blocks having clutch faces and arranged between the disk and the lower end portion of the sleeve, spring
 55 means for holding said blocks in engagement with one another, one of the blocks being fixed to the sleeve and loosely surrounding the stem and the other block being unattached and having means for en-
 60 gagement in said groove.

11. An instrument for drawing circles comprising a centering means, a circle scribing means and actuating means associated with the circle scribing and centering means and operative by pressure thereon directed
 65 toward the centering means to maintain the centering means in fixed position and to automatically and simultaneously move the scribing means.

12. An instrument for drawing circles
 70 comprising a centering means, a circle scribing means and an actuating means for producing the operation of the circle scribing means and including a manually operated part and means structurally independent of
 75 the centering means and of the manually operated part for rotating the scribing means consequent to the operation of said manually operated part.

In testimony whereof I have hereunto set
 80 my hand in presence of two subscribing witnesses.

JOHN H. McMURRAY.

Witnesses:

L. SUDMYER,
 PHILIP BENCIVENGA.