Aug. 30, 1960 G. C. BURGESS 2,950,535

LAY OUT INSTRUMENT

Filed Feb. 25, 1957 3 Sheets-Sheet 1

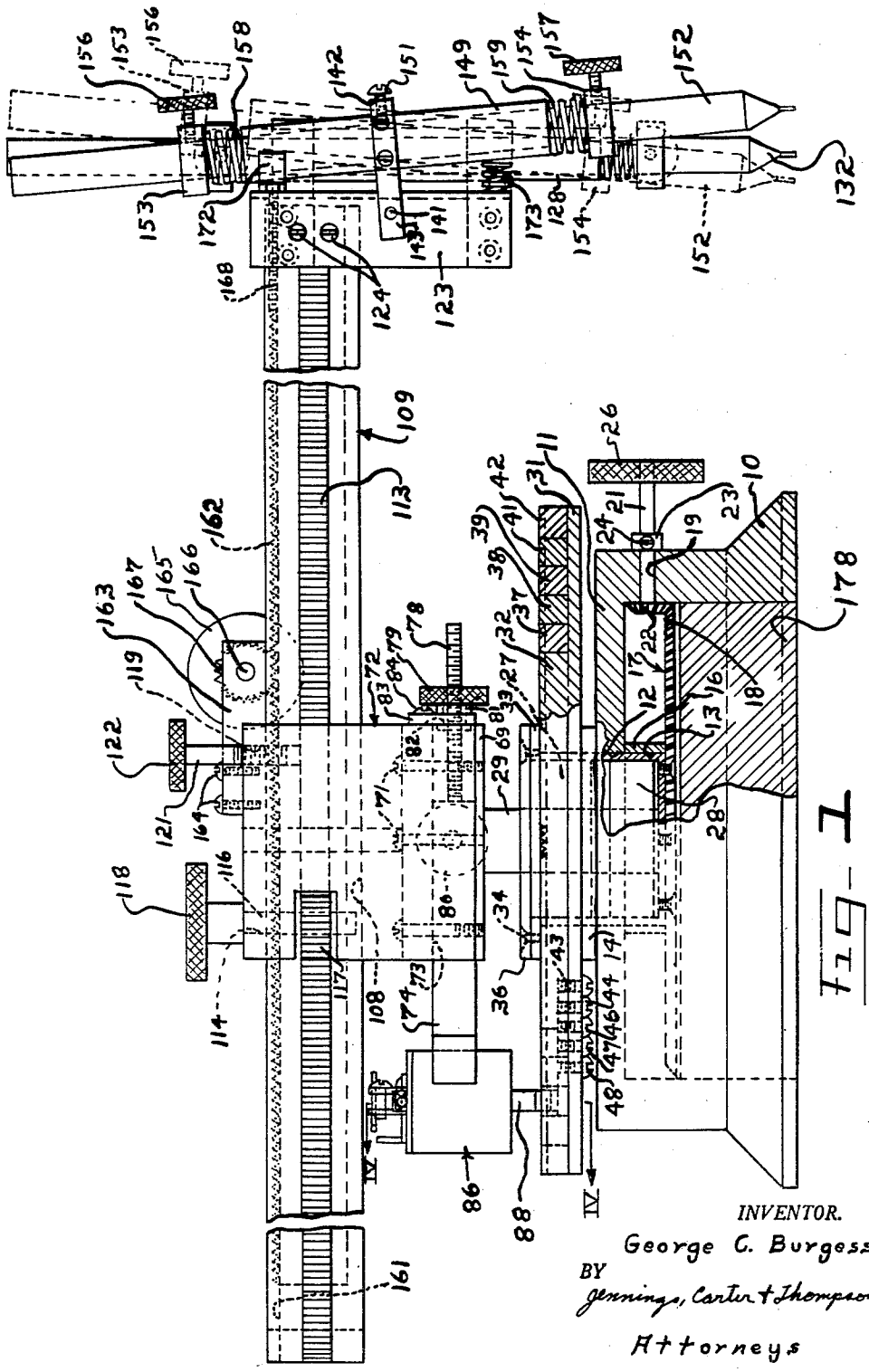


Fig. 1

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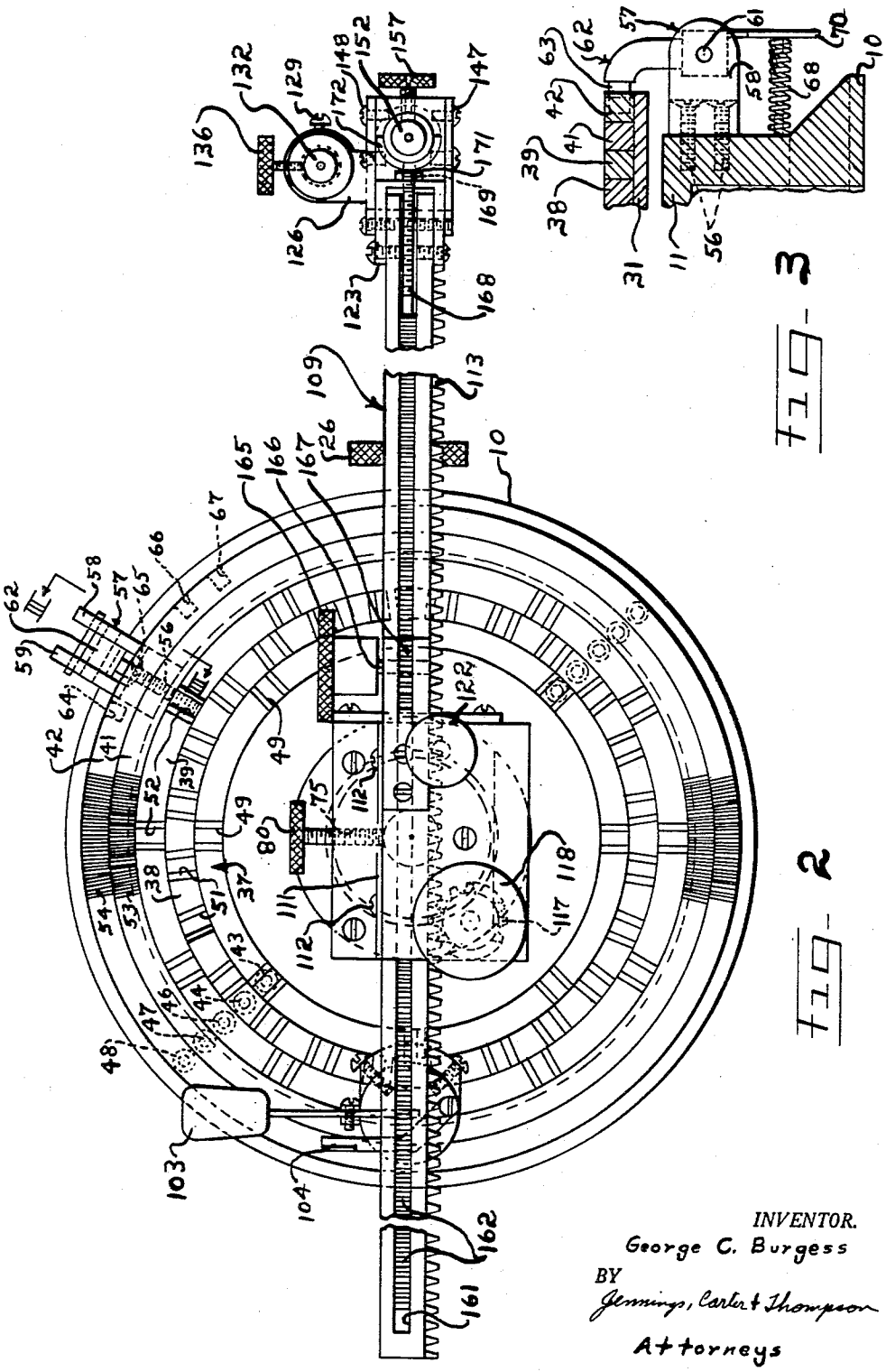


Fig. 2

Fig. 3

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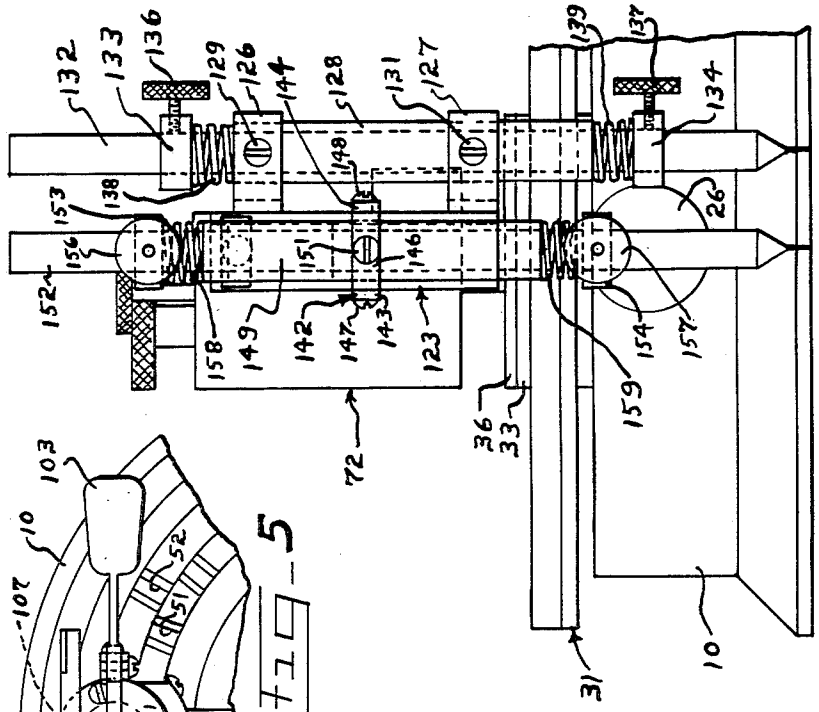


FIG. 7

FIG. 5

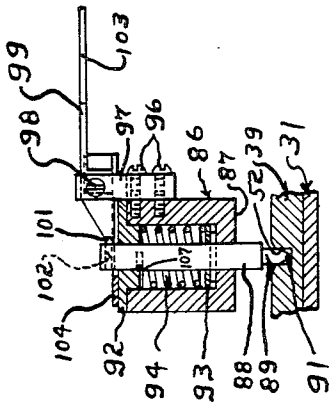


FIG. 4

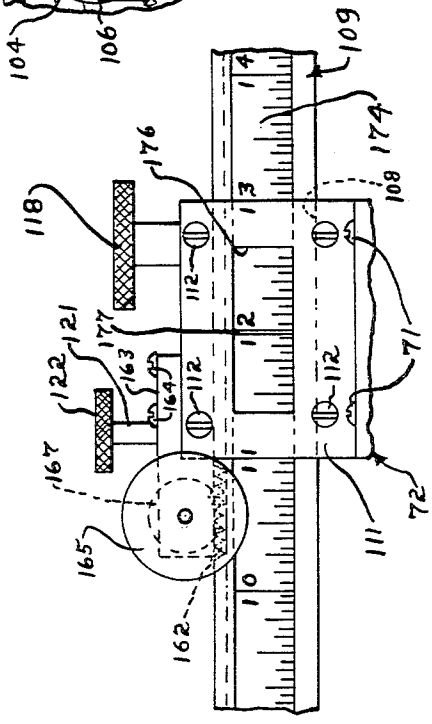


FIG. 6

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LAY OUT INSTRUMENT

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11 Claims. (Cl. 33—26)

This invention relates to a layout instrument and more particularly to an instrument which shall be adapted for laying out annular or curved members, such as marking the bolt hole positions in annular flanges and the like.

An object of my invention is to provide a layout instrument of the character designated in which a plurality of angularly spaced markings may be accurately applied to the member to be laid out in a minimum of time.

Another object of my invention is to provide a layout instrument of the character designated which shall include magnetic means holding the instrument in predetermined alignment with a supporting surface regardless of the position of the supporting surface whereby the instrument may be readily applied to the supporting or working surface.

Another object of my invention is to provide a layout instrument of the character designated which shall be adapted for applying both circular and transverse marks at specific angular positions on the member being laid out.

A further object of my invention is to provide a layout instrument of the character designated which shall include improved means for adjusting and setting the radius of the circular marking member and shall include improved means for setting the selected angular positions to be marked by the transverse marking member.

A more specific object of my invention is to provide releasable means which permits the transverse marking member to be moved sequentially to the selected angular positions on the member being laid out.

A still further object of my invention is to provide a layout instrument of the character designated which shall be simple of construction, economical of manufacture and one which is positive in operation.

Briefly, my improved layout instrument comprises a supporting base having a magnet associated therewith for holding the base in predetermined alignment with a supporting surface. Annular members having a plurality of angularly spaced recesses therein are mounted on the base. Mounted for rotary movement adjacent the center of the annular members is a bracket which carries an elongated member which is adjustable relative to the bracket. Rotatable with the elongated member and adapted to engage the recesses in the annular member is a latch member for holding the elongated member in selected angular positions. A pair of marking members are mounted adjacent the outer end of the elongated member, one marking member being mounted for pivotal movement whereby a mark is made transversely of a circular mark made by the other marking member.

Apparatus embodying features of my invention is illustrated in the accompanying drawings forming a part of this application, in which:

Fig. 1 is a side elevational view, partly broken away and in section;

Fig. 2 is a plan view, partly broken away, with the upper retaining collar of one of the marking members being omitted for the sake of clarity;

Fig. 3 is a sectional view taken generally along the line III—III of Fig. 2;

Fig. 4 is a sectional view taken generally along the line IV—IV of Fig. 1;

Fig. 5 is a fragmental plan view of the apparatus shown in Fig. 4;

Fig. 6 is a fragmental side elevational view showing the opposite side of the bracket and elongated member from that shown in Fig. 1; and,

Fig. 7 is an end elevational view, partly broken away.

Referring now to the drawings for a better understanding of my invention, I show an annular base member 10 having an upper wall 11 formed integrally therewith, as shown in Fig. 1. A centrally disposed opening 12 is provided in the upper wall 11 for receiving a cup shaped member 13. Secured to the cup shaped member 13 above and below the wall 11 are collars 14 and 16 which limit axial movement of the cup shaped member relative to the wall 11. Secured to the undersurface of the cup shaped member 13 is a circular plate 17 which carries a beveled ring gear 18 at the periphery thereof. A suitable opening 19 is provided in the base 10 for receiving a shaft 21 having a beveled gear 22 at the inner end thereof which meshes with the beveled ring gear 18. A collar 23 is attached to the shaft 21 by means of a set screw 24 to limit axial movement of the shaft 21 relative to the base 10. A suitable operating knob 26 is secured to the outer end of the shaft 21 for rotating the same.

Mounted within the cup shaped member 13 are upper and lower bearings 27 and 28, respectively, for receiving the lower end of a vertical shaft 29. The outer races of the bearings 27 and 28 engage the inner surface of the cup-shaped member 13 with a press fit whereby the bearings are held against axial movement relative to the cup shaped member. The inner races of the bearings 27 and 28 engage the shaft 29 with a press fit whereby the shaft is held against axial movement relative to the inner races of the bearings.

Secured rigidly to the cup shaped member 13 above the collar 14 is a circular plate 31 having a raised central portion 32. As shown in Fig. 1, the upper end of the cup shaped member 13 flares outwardly to form an annular outturned flange 33. Surrounding the shaft 29 and secured to the outturned flange 33 of the cup shaped member 13 by means of a screw 34 is a disc like collar 36.

Mounted on the plate 31 outwardly of the raised portion 32 thereof are concentric rings or annular members 37, 38, 39, 41 and 42 which are secured to the plate 31 by any suitable means, such as screws 43, 44, 46, 47 and 48 which pass through suitable openings in the plate 31 and then into threaded openings in the annular members. The annular member 37 is provided with angularly spaced recesses 49 therein which are spaced approximately 45° from each other. The annular member 38 is provided with recesses 51 therein which are angularly spaced 15° apart. The annular member 39 is provided with recesses 52 therein which are angularly spaced 30° apart. The annular members 41 and 42 are provided with angularly spaced recesses 53 and 54, respectively, which are spaced 2° apart. As shown in Fig. 2, the recesses 53 are spaced midway between the recesses 54 whereby each recess 53 is positioned 1° from each of the adjacent recesses 54. The recesses 52 are positioned midway between the recesses 51 whereby each recess 51 lies substantially 7½° from the adjacent recess 52. The recesses 49 are positioned 7½° from the adjacent recesses 51, as shown in Fig. 2.

As shown in Fig. 3, mounted on the base 10 by means

of screws 56 is an outstanding bracket 57 having spaced lugs 58 and 59.

Mounted for pivotal movement between the lugs 58 and 59 on a transverse shaft 61 is a lever arm 62 having an inwardly extending detent 63 positioned opposite the annular member 42. Angularly spaced recesses 64, 65, 66 and 67 are provided in the annular member 42 for receiving the detent 63, as shown in Fig. 2. The recess 64 is positioned 7½° from the recess 65. The recess 65 is positioned 15° from the recess 66 and the recess 66 is positioned 7½° from the recess 67. The lever arm 62 is provided with a depending handle member 70 for removing the detent 63 from the recesses in the annular member 42. The detent 63 is urged into engagement with the recesses by a compression spring 68 which is interposed between the operating arm 70 and the base 10, as shown in Fig. 3. It will thus be seen that by releasing the detent 63 from engagement with the recesses in the annular member 42, the entire group of annular members carried by the plate member 31 may be moved angularly of the base member to the selected positions as determined by the positions of the recesses 64, 65, 66 and 67.

Secured to the upper end of the shaft 29 is a plate 69. Mounted on the plate 69 by means of screws 71 is an upstanding bracket 72 which is preferably rectangular in shape. A transverse slot 73 is provided adjacent the lower end of the bracket 72, as shown in Fig. 1 for receiving a transverse arm 74. Positioned within the slot 73 and secured to the inner end of the arm 74 is a threaded member 78 for receiving an internally threaded operating member 79. As shown in Fig. 1, the operating member 79 is provided with an axially extending portion 81 having an annular recess 82 therein which fits in a suitable opening provided in a plate-like member 83. The plate-like member 83 is secured to the bracket 72 by means of screws 84. The plate-like member 83 engages the shoulders at opposite sides of the recess 82 to limit axial movement of the operating member 79 relative to the bracket 72. It will thus be seen that upon rotation of the operating member 79, the threaded member 78 together with the arm 74 move transversely of the bracket 72. To lock the arm 74 in selected positions, a threaded opening 75 is provided in the bracket 72 for receiving a thumb screw 80 which is adapted to engage the side of the arm 74.

Mounted adjacent the outer end of the arm 74 is a cylindrical housing 86 having an annular inturned flange 87 formed integrally with the lower end thereof. Mounted for vertical movement in the cylindrical housing 86 is an actuating rod or latch 88 having a reduced diameter lower end 89 for engaging the recesses in the annular members, as shown in Fig. 4. The lower end of the latch 88 is provided with a relatively sharp point 91 which is adapted to engage the smaller recesses 53 and 54 formed in the annular members 41 and 42, while the larger portion 89 engages the recesses 49, 51 and 52. Surrounding the actuating rod or latch 88 at the upper end of the cylindrical housing 86 is an annular spring abutment 92 which is secured to the cylindrical housing, by any suitable means. Secured to the actuating rod or latch 88 within the housing 86 is a spring abutment 93. Positioned between the spring abutments 92 and 93 is a compression spring 94 which urges the latch 88 downwardly into engagement with the recess in the subjacent annular member. Mounted on the side of the cylindrical housing 86 by means of screws 96 is an upstanding bracket 97. Pivotally connected to the bracket 97 by means of a transverse pin 98 is a lever arm 99. As shown in Fig. 4, the lever arm 99 is provided with a small diameter portion 101 which is adapted to slidably engage a transverse opening 102 provided in the upper end of the actuating rod or latch 88. The other end of the lever 99 is provided with an actuating handle member 103 for moving the lever arm about its pivot pin 98. To lock the latch 88 in its uppermost position, I pivotally mount a locking arm 104 on the housing 86 by means of a pivot pin 106, as shown in Fig. 5. The locking arm 104 is relatively flat and is adapted to engage a transverse notch 107 provided adjacent the upper end of the actuating rod or latch 88. It will thus be seen that by raising the latch 88 so that the transverse notch 107 is opposite the locking arm 104, the latch 88 can be locked in this position by moving the arm 104 into engagement with the notch 107.

A transverse slot 108 is provided in the bracket 72 above the slot 73 for slidably receiving an arm or elongated member 109. The elongated member 109 is held in the transverse slot 108 by means of a plate 111 which is secured in place by screws 112.

Extending longitudinally of one side of the elongated member 109 and secured thereto by any suitable means is a rack 113. A vertically extending opening 114 is provided in the bracket 72 for receiving a vertical shaft 116 having a pinion 117 mounted non-rotatably thereon. Mounted on the shafts 116 above the bracket 72 is an actuating knob 118 for rotating the shaft 116 and the pinion 117 whereby the rack and elongated member 109 are moved longitudinally of the bracket 72. To lock the elongated member 109 in selected positions relative to the bracket 72, I provide a vertical opening 119 in the bracket 72 for receiving a threaded pin 121 having an operating knob 122 adjacent the upper end thereof. The lower end of the threaded pin 121 is adapted to engage the upper surface of the rack 113 whereby the rack and elongated member are locked in selected positions.

Mounted adjacent the outer end of the arm or elongated member 109 is a depending bracket 123 which is secured to the elongated member by suitable screws 124. Mounted adjacent the upper and lower ends of the bracket 123 and at one side thereof are upper and lower brackets 126 and 127, respectively, having suitable openings therethrough for receiving a cylindrical member 128, as shown in Fig. 7. The cylindrical member 128 is held in selected positions relative to the brackets 126 and 127 by means of set screws 129 and 131. The cylindrical member 128 is adapted to receive a drawing or marking member, such as a pencil 132. The drawing member 132 is held in selected positions relative to the cylindrical member 128 by upper and lower collars 133 and 134, respectively. The collars 133 and 134 are attached to the pencil 132 by means of set screws 136 and 137. Positioned between the collars 133 and 134 and the adjacent ends of the cylindrical member 128 are compression springs 138 and 139, respectively, which resiliently hold the pencil in place whereby it is adapted for vertical movement upon the application of a predetermined pressure to the point of the pencil.

Pivotally mounted to the bracket 123 by means of a pivot pin 141 is an outwardly extending bracket 142. As shown in Fig. 7, the bracket 142 comprises laterally spaced arms 143 and 144. Mounted between the outer ends of the arms 143 and 144 is a block member 146 which is secured to the outer ends of the arms 143 and 144 by screws 147 and 148. The block member 146 is provided with a centrally disposed opening therethrough for receiving a cylindrical member 149 which is attached to the block 146 by means of a set screw 151. The cylindrical member 149 is adapted to receive a second marking member, such as a pencil 152, which is held in place by means of upper and lower collars 153 and 154. Pencil 152 is positioned at substantially the same distance from the axis of rotation of arm 109 as the pencil 132 and is offset angularly from pencil 132 so that it may make a mark across the circle transcribed by pencil 132. The collars 153 and 154 are locked to the pencil by means of set screws 156 and 157, respectively. Positioned between the collars 153 and 154 and the adjacent ends of the cylindrical member 149 are compression springs 158 and 159 which resiliently hold the pencil 152 in place.

A longitudinally extending groove 161 is provided in the upper surface of the elongated member 109, as shown in Fig. 2 for slidably receiving an elongated rack mem-

ber 162. Mounted on top of the bracket 72 is an outstanding bracket 163 which is secured to the bracket 72 by screws 164. Mounted for rotation adjacent the outer end of the bracket 163 on a transverse shaft 166 is a gear 167 which is disposed to engage the rack 162 whereby the rack is moved longitudinally of the groove 161. The shaft 166 is rotated by means of an actuating knob 165. Secured to the outer end of the rack 162 is a threaded member 168 which extends through a suitable opening 169 provided in the depending bracket 123, as shown in Fig. 2. An adjusting nut 171 is mounted on the threaded member 168 outwardly of the depending bracket 123 whereby inward movement of the threaded member relative to the bracket 123 is limited. Secured rigidly to the outer end of the threaded member 168 is a U-shaped bracket 172 which is adapted to engage the upper portion of the cylindrical member 149 whereby it is moved about the pivot pin 141, as shown in dotted lines in Fig. 1. Positioned between the lower end of the depending bracket 123 and the lower end of the cylindrical member 149 is a compression spring 173 which urges the lower end of the cylindrical member 149 outwardly whereby the pencil 152 returns to the solid line position upon release of the actuating knob 165 which rotates the shaft 166 and gear 167. It should be noted that pencil 152 is out of engagement with the supporting surface while pencil 132 is making a circular mark. Upon actuation of knob 165, pencil 152 engages the supporting surface and makes a mark across the circular mark or line made by pencil 132.

As shown in Fig. 6, the side of the elongated member 109 opposite the rack 113 is provided with a suitable scale 174 to indicate the position of the marking members relative to the center of the apparatus. A suitable window 176 is provided in the plate 111 whereby the scale 174 is exposed. The window 176 is provided with a vertical index member 177 to indicate the exact position of the scale 174.

Mounted in the base 10 beneath the plate 17 is a suitable magnet 178 for holding the apparatus in predetermined alignment with a supporting magnetizable surface, such as the surface in which bolt holes or the like are to be indicated.

From the foregoing description, the operation of my improved layout instrument will be readily understood. The base 10 is attached to the supporting surface by means of the magnet 178 whereby it is held in predetermined alignment with the supporting surface. That is, the base 10 is aligned whereby the index mark 177 lies at the center of the angularly spaced marks to be laid out or indicated. With the base 10 locked in this position by the magnet 178, the arm 74 is moved by adjusting the actuating member 79 so that the latch 88 overlies the selected annular member 37, 38, 39, 41 or 42, as the case may be. That is to say, if it is desired to indicate marks 45° apart, the latch 88 is moved whereby it overlies the annular member 37. Upon rotation of the elongated member together with the bracket 72, the reduced portion 89 of the latch 88 falls into the adjacent recess 49. The elongated member 109 is adjusted to the proper radius by rotating the actuating knob 118 thereby turning the gear 117 to move the rack 113 and the elongated member relative to the bracket 72. The elongated member 109 is then locked in place by the operating knob 122. With the elongated member set in the proper position, as indicated by the position of the scale 174 relative to the index member 177, the actuating knob 165 is turned so as to urge the rack 162 outwardly thereby moving the U-shaped bracket 172, the marking member 152 and the bracket 142 about the pivot pin 141 to the dotted line position shown in Fig. 1. Upon release of the actuating knob 165, the spring 173 returns the marking member 152 to its original position. The latch 88 is then lifted by moving the handle portion 103 of the lever arm 99 downwardly. The elongated member 109 and bracket 72 are then rotated until the latch 88 falls into the next

recess which is positioned an angular distance of 45°. This procedure is repeated until the desired number of marks 45° apart are indicated on the member being laid out.

To space the marks 15° apart, the arm 74 is adjusted by turning the knob 79 until the latch 88 is over the annular member 38. If it is desired to position the marks 30° apart, the arm 74 is moved whereby the latch 88 is positioned over the annular member 39.

To position the marks 2° apart, the arm 74 is adjusted whereby the latch 88 is positioned over the annular member 41 or 42. If it is desired to position the marks 1° apart, the marks are first made by positioning the actuating rod 88 over the annular member 41 whereupon the marks are made 2° apart. The arm 74 is then moved outwardly whereby the latch 88 is positioned over the annular member 42. The marks are then applied midway between the 2° marks made while the latch was over the annular member 41. It will thus be seen that by varying the position of the arm 74 and the latch 88 carried thereby, a plurality of pre-determined angularly spaced marks may be applied to the surface to be laid out. To provide further adjustment of the device, the entire plate 31 carrying the annular members 37, 38, 39, 41 and 42 may be rotated by turning the actuating knob 26 to position the detent 63 in selected ones of the recesses 64, 65, 66 and 67.

It will thus be seen that as the elongated member 109 is rotated, the marking member 132 makes a circular path as determined by the position of the elongated member 109 relative to the index mark 177. By adjusting the position of the arm 74 whereby the latch 88 is positioned over the desired annular member, the elongated member rotates a predetermined angular position until the latch 88 falls into the next recess whereupon the knob 165 is turned to actuate the gear 167 to cause movement of the marking member 152 about the pivot pin 141 thus making a mark transversely of the circular mark made by the marking member 132. By providing the angularly spaced recesses in the annular members together with the releasable latch 88, the angularly spaced marks may be accurately indicated sequentially on the member to be laid out in a minimum of time.

While I have shown my invention in but one form, it will be obvious to those skilled in the art that it is not so limited, but is susceptible of various changes and modifications without departing from the spirit thereof, and I desire, therefore, that only such limitations shall be placed thereupon as are specifically set forth in the appended claims.

What I claim is:

1. A layout instrument comprising a supporting base, magnetic means holding said base in predetermined alignment with a supporting surface, a plurality of concentric annular members mounted on said base and adapted to lie substantially parallel to said supporting surface, there being a plurality of angularly spaced recesses in each of said annular members, a rotatable bracket mounted for rotation on said base adjacent the center of said annular members, an elongated member mounted on said bracket and adapted for longitudinal adjustment relative to said bracket, an arm carried by said bracket and extending outwardly substantially parallel to said annular members on the sides thereof adjacent said recesses, means for moving said arm radially of said annular members, a latch mounted adjacent the outer end of said arm adapted to be disposed over a selected one of the annular members through radial adjustment of said arm, spring means urging said latch into engagement with the recesses in the selected annular member, means for removing said latch from said recesses, a marking member mounted adjacent the outer end of said elongated member and adapted to make a circular mark in response to circular movement of said outer end of the elongated member, a second

marking member mounted adjacent the outer end of said elongated member and being offset angularly from said first marking member, and means moving said second marking member relative to said first mentioned marking member and transversely of the mark made by the first mentioned marking member.

2. A layout instrument comprising a supporting base, magnetic means holding said base in predetermined alignment with a supporting surface, a plurality of concentric annular members mounted on said base and adapted to lie substantially parallel to said supporting surface, there being a plurality of angularly spaced recesses in each of said annular members, a rotatable bracket mounted for rotation on said base adjacent the center of said annular members, an elongated member mounted on said bracket and adapted for longitudinal movement relative thereto, an elongated rack extending alongside and carried by said elongated member, a pinion carried by said bracket in position to engage said rack, means rotating said pinion whereby the position of the elongated member is adjusted relative to said bracket, an arm carried by said bracket and extending outwardly substantially parallel to said annular members on the sides thereof adjacent said recesses, means for moving said arm radially of said annular members a latch mounted adjacent the outer end of said arm adapted to be disposed over a selected one of the annular members through radial adjustment of said arm, means urging said latch into engagement with the recesses in the selected annular member, means for removing said latch from said recesses, a marking member adjacent the outer end of said elongated member and adapted to make a circular mark in response to circular movement of said outer end of the elongated member, a second marking member mounted adjacent the outer end of said elongated member, said second marking member being offset angularly from said first marking member and being positioned at substantially the same distance from the axis of rotation of said elongated member as said first marking member, and means moving said second marking member relative to said first mentioned marking member and transversely of the mark made by the first mentioned marking member.

3. A layout instrument comprising a supporting base, magnetic means holding said base in predetermined alignment with a supporting surface, an annular member mounted on said base and adapted to lie substantially parallel to said supporting surface, there being a plurality of angularly spaced recesses in said annular member, a bracket mounted for rotation on said base adjacent the center of said annular member, an elongated member carried by said bracket and adapted for longitudinal adjustment relative thereto, a latch carried by said bracket and adapted to engage the recesses in said annular member, means for removing said latch from said recesses, a marking member mounted adjacent the outer end of said elongated member and adapted to make a circular mark in response to circular movement of the outer end of the elongated member, a second marking member mounted for pivotal movement intermediate its ends adjacent the outer end of said elongated member, said second marking member being offset angularly from said first marking member and being positioned at substantially the same distance from the axis of rotation of said elongated member as said first marking member, and an actuating member carried by said elongated member disposed to engage and pivot said second marking member relative to the first mentioned marking member and said elongated member in a plane parallel to the longitudinal axis of the elongated member whereby the second marking member makes a mark transversely of the mark made by the first mentioned marking member.

4. A layout instrument as defined in claim 3 in which the actuating member comprises an elongated rack mounted for sliding movement relative to the elongated member, a pinion carried by the bracket and disposed to engage said rack, means for rotating said pinion and means at the outer end of said rack disposed to engage said second marking member.

5. A layout instrument as defined in claim 4 in which a substantially U-shaped bracket is mounted at the outer end of the rack for engaging the second marking member at one side of its pivotal connection to the elongated member.

6. A layout instrument as defined in claim 5 in which a depending bracket is mounted adjacent the outer end of the elongated member and the second marking member is pivotally connected intermediate its ends to said depending bracket with the U-shaped bracket positioned at one side of the pivoted connection and spring means interposed between the second marking member and said depending bracket on the opposite side of said pivotal connection from said U-shaped bracket.

7. A layout instrument comprising a supporting base, magnetic means holding said base in predetermined alignment with a supporting surface, an annular member mounted on said base and adapted to lie substantially parallel to said supporting surface, there being a plurality of angularly spaced recesses in said annular member, a bracket mounted for rotation on said base adjacent the center of said annular member, an elongated member carried by said bracket and adapted for longitudinal adjustment relative thereto, means locking said elongated member at selected positions relative to said bracket, a latch carried by said bracket and adapted to engage the recesses in said annular member, means for removing said latch from said recesses, a marking member mounted adjacent the outer end of said elongated member and adapted to make a circular mark in response to circular movement of the outer end of the elongated member, a second marking member mounted adjacent the outer end of said elongated member, said second marking member being offset angularly from said first marking member and being positioned at substantially the same distance from the axis of rotation of said elongated member as said first marking member, and means on said elongated member moving said second marking member relative to said first mentioned marking member and transversely of the mark made by the first mentioned marking member.

8. A layout instrument as defined in claim 7 in which the marking members are in the form of cylindrical members for receiving pencils, the first mentioned marking member being mounted rigidly on the elongated member and the second marking member being pivotally mounted on the elongated member.

9. A layout instrument comprising a supporting base, means holding said base in predetermined alignment with a supporting surface, an annular member mounted on said base and adapted to lie substantially parallel to said supporting surface, there being a plurality of angularly spaced recesses in said annular member, an elongated member mounted for rotary movement intermediate its ends on said base and adjacent the center of said annular member, means adjusting said elongated member longitudinally of said base, a latch rotatable with said elongated member and adapted to engage the recesses in said annular member, means for releasing said latch from said recesses, a tubular member mounted adjacent the outer end of said elongated member and extending substantially normal thereto, a marking member mounted for axial movement within said tubular member and adapted to make a circular mark in response to circular movement of said outer end of the elongated member, a second tubular member pivotally mounted intermediate its ends adjacent the outer end of said elongated member and transversely thereof, said second tubular member extending substantially parallel to the first mentioned tubular member, a second marking member

mounted for axial movement within said second tubular member, said second marking member being offset angularly from said first marking member and being positioned at substantially the same distance from the axis of rotation of said elongated member as said first marking member, means moving said second tubular member about its pivot point relative to said first mentioned marking member whereby the second marking member moves transversely of the mark made by the first mentioned marking member, spring abutments adjustably connected to said marking members in spaced relation to the ends of said tubular members, and compression springs surrounding said marking members intermediate said spring abutments and the ends of said tubular members.

10. A layout instrument comprising a base, means holding said base in predetermined alignment with a supporting surface, at least one annular member mounted on said base and adapted to lie substantially parallel to said supporting surface, there being a plurality of angularly spaced recesses in said annular member, a bracket mounted for rotation on said base adjacent the center of said annular member, an elongated member extending transversely of said bracket and adapted for longitudinal adjustment relative thereto, means carried by said bracket and adapted to engage selectively the recesses in said annular member, a first marking member mounted adjacent the outer end of said elongated member and adapted to make a circular mark in response to circular movement of the outer end of the elongated member, a second marking member pivotally mounted adjacent the outer end of said elongated member at substantially the same distance from the axis of rotation of said elongated member as said first marking member and being offset angularly from said first marking member, and means on said elongated member to pivot said second marking member in a plane generally parallel to the longitudinal axis of said elongated member and across the circular mark made by said first marking member whereby a cross mark is made for positioning bolt holes and the like.

11. An instrument for drawing and marking layout circles comprising a supporting base, means holding the base in predetermined alignment with a supporting surface, a bracket mounted for rotation on said base, an elongated arm carried by said bracket and extending therefrom over the surface on which the circle is to be drawn, means mounting said arm for longitudinal adjustment to selected positions relative to the center of rotation of said bracket, a drawing member mounted adjacent the outer end of said arm and adapted to draw a circular line on said surface in response to circular movement of the arm, a marking member mounted adjacent the outer end of said arm at substantially the same radial distance from the axis of rotation of said arm as said drawing member, but on a different radius and angularly displaced from said drawing member, said marking member being out of contact with said surface while the circular line is being made by said drawing member, and means on said arm to move said marking member radially of the circular line and into contact with the surface to make a mark across the circular line made by said drawing member.

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