Jan. 25, 1927. 1,615,668

I. A. P. ANDERSON

LAYING OUT FIXTURE AND DRILLING JIG

Filed June 5, 1924 2 Sheets-Sheet 1

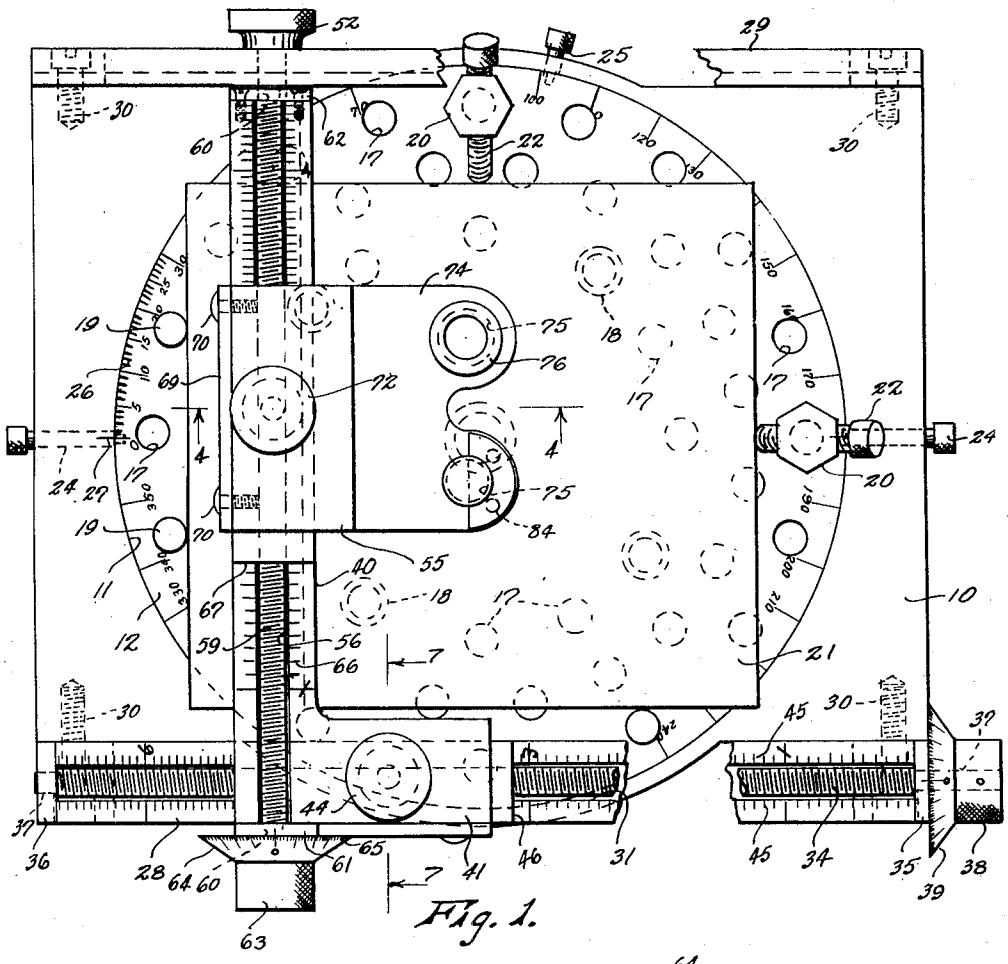


Fig. 1.

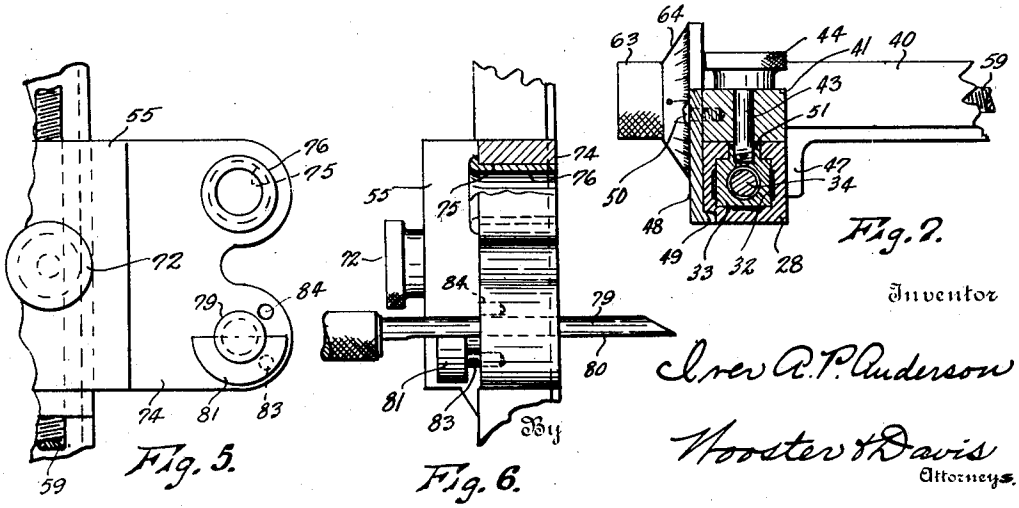


Fig. 5.

Fig. 6.

Fig. 2.

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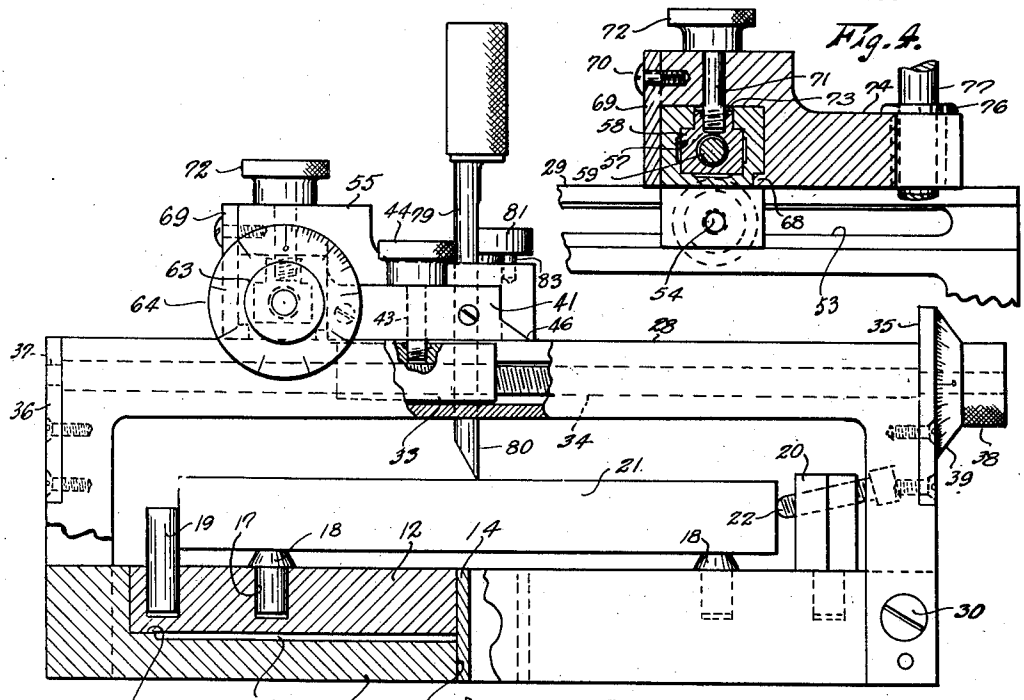


Fig. 2.

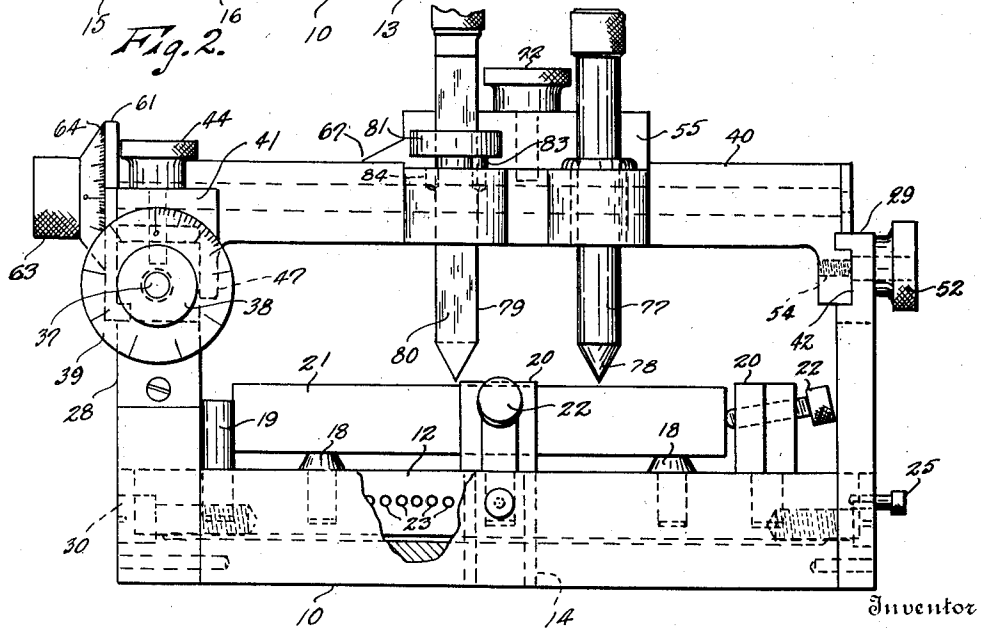


Fig. 3.

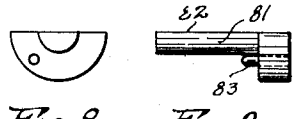


Fig. 8. Fig. 9.

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UNITED STATES PATENT OFFICE.

IVER A. P. ANDERSON, OF BRIDGEPORT, CONNECTICUT.

LAYING-OUT FIXTURE AND DRILLING JIG.

Application filed June 5, 1924. Serial No. 718,171.

My invention relates to a plotting and laying out device for determining different positions on a given surface, and also a drilling jig to facilitate drilling holes in these positions after they have been determined. It has for an object to provide a device of this character which will be simple in construction and will be so constructed and arranged that any desired position within the limits of the device may be quickly, easily and accurately determined. It is especially adapted as a laying out fixture for tool makers.

With the foregoing and other objects in view, I have devised the construction illustrated in the accompanying drawings forming a part of this specification, similar reference characters being employed throughout the various figures to indicate corresponding elements. In these drawings,

Fig. 1 is a top plan view of the device.

Fig. 2 is a side elevation looking from the bottom of Fig. 1, portions being broken away to more clearly show the construction.

Fig. 3 is an end view looking from the right of Fig. 1.

Fig. 4 is a transverse section through the locating head substantially on line 4—4 of Fig. 1.

Fig. 5 is a top plan view of a portion of the locating head showing a different position of the marker.

Fig. 6 is a side elevation thereof looking from the right of Fig. 5.

Fig. 7 is a detail transverse section substantially on line 7—7 of Fig. 1.

Fig. 8 is an end view of the marker securing means, and

Fig. 9 is a side elevation thereof.

The device comprises a base 10 counterbored on its upper side, as shown at 11, to receive a rotatable work supporting table 12, the counterbore being preferably of such a depth that the top of the table will be flush with the top of the base, as shown in Fig. 2. A central opening 13 is provided through the table and base carrying a bushing 14 about which the table rotates. There is provided a narrow shelf 15 forming a finished bearing surface for the rim of the table leaving a clearance 16 between the bottom of the table and the base. This gives a rigid support for the table without interfering with its ready rotation in the base. The table is provided with any suitable number of drilled openings 17 extending downwardly from the top surface thereof to receive suitable supporting pins 18 and securing pins 19 and 20 for the work which is indicated in the drawing as a rectangular block 21. The openings 17 preferably do not pass entirely through the table so that chips from the work cannot pass to the under side of the table. The supporting pins 18 are preferably provided with tapered heads, as shown, to support the work a short distance above the top surface of the table. The pins 19 are provided to be engaged by two sides of the block while the pins 20 are preferably hexagonal in cross section and located on the other two sides of the work. They carry screws 22 arranged to engage at their ends on the sides of the work and clamp it against the pins 19. The screws 22 are inclined somewhat so that when tightened they will press the work against the supporting pins 18. The rotatable table is provided with means for securing it in different angular positions about its axis of rotation. A simple and effective means for doing this is to provide a series of openings 23 in the periphery of the table and mount suitable pins 24 and 25 in the base, these pins having ends adapted to fit the openings 23 to hold the table in adjusted positions. Coacting scales 26 and 27 may also be provided on the table and the base to indicate the angular position of the table. If it is found that a half degree adjustment is sufficient, the periphery may be provided with 360 openings 23, these openings being spaced one degree apart and then the pin 24 would hold the table in positions one degree apart. If the pin 25 is located a different number of degrees from the pin 24 plus one-half a degree then pin 25 will hold the table in positions half way between the positions in which it may be held by the pin 24. By suitably locating additional pins adjustments as fine as desired may be secured for the table.

Located above the table and base at opposite sides of the base and extending parallel therewith and with each other is a pair of guides 28 and 29 secured to the base by any suitable means, such as screws 30. These guides are preferably substantially U-shaped, as shown, to leave a clearance space under the guide proper to facilitate use of the device. The guide 28 has a slot 31 along the top thereof leading to a rectangular guideway 32 in which is slidably mounted a nut 33 threaded on an adjusting screw 34. This screw is mounted to rotate in suitable bear-

ings 35 and 36 secured to the ends of the guide, the ends of the screw being reduced to fit these bearings, as shown at 37. These reduced ends form shoulders which engage the bearing plates 36 and 37 to retain the screw against longitudinal movement. To one end of the screw is secured a knurled head 38 for rotating the screw, and this head has a disc 39 provided with a scale cooperating with a scale on the bearing plate 35 to indicate different positions of the screw.

Extending between the guides 28 and 29, and mounted to slide therein, is a support 40 having a transverse head 41 guided by the main guide 28 and at its other end being seated in the guideway 42. A clamping screw 43 provided with a knurled head 44 is carried by the head 41 of the support and is threaded into the nut 33. By loosening this screw and rotating the screw 34 the support 40 may be adjusted along the guides 28 and 29 above the work supporting table and in a plane parallel therewith. Suitable scales 45 may be provided on the guide 28 to indicate the positions of the support, and the scale on the disc 39 will indicate fractional adjustments which could not be easily read on the scale 45. To facilitate easy reading of the scale the head 41 is provided with a straight edge 46 closely adjacent this scale. A guiding lug 47 extends downwardly from the support 40 to engage the inner side of guide 28, and on the opposite side of the head 41 is secured a plate 48 having a rib 49 on its lower edge seated in a groove in the other side of the guide. This rib prevents the support lifting off from the guide, and the large bearing surface always retains the support 40 at right angles to the guides 28 and 29. The plate 48 is secured to the head 41 by any suitable means, as screws 50. To facilitate insertion of the threaded end of the clamp screw 43 in the nut 33 the threaded opening in the nut is counterbored a short distance from the top thereof, as shown at 51.

Means is also preferably provided for clamping the opposite end of the support 40 in adjusted positions. For this purpose a clamping screw 52 projects through a slot 53 in the guide 29 and is threaded into the end of the support, as shown at 54. The screw is provided with a knurled head to facilitate clamping of the screw.

Mounted to slide on the support 40 is a locating head 55, and this head is so mounted on the support that it is slidable longitudinally thereof. As the support is located at right angles to the direction of its movement on the guides 28 and 29 the movement of the head 55 will be at right angles to a direction of movement of the support and in a plane parallel to the plane of the work supporting table. At the upper side of the guide 40 is a slot 56 leading to a rectangular guide way 57 in which is mounted a nut 58 threaded on an adjusting screw 59. This screw is similar to the adjusting screw 34 for the support 40. It is reduced at its opposite ends, as shown at 60, to extend through bearings in the plates 61 and 62 secured to the ends of the support. These reduced ends form shoulders engaging these plates to prevent longitudinal movement of the screw. At one end of the screw is a knurled head 63 for rotating the screw having a disc 64 provided with a scale 65 cooperating with a scale on the plate 61 to indicate angular positions of the screw. To cooperate with the scale 66 on the top of the support 40 to indicate the positions of the locating head on this support this head is provided with a transverse straight edge 67 passing over this scale.

The head 55 rests on the top of the support 40, as shown in Fig. 4. It also engages one side thereof and is provided with a transverse rib 68 seating in a groove at the lower side of the support. This will prevent the head lifting from the support. At the opposite side of the support a plate 69 is secured to the head by suitable screws 70 and forms a guide on the other side of the support. A clamping screw 71 passes through the head and is threaded into the nut 58. This screw has a knurled head 72, and the threaded opening in the nut is counterbored at 73 to facilitate the entrance of the end of the screw into the nut. After the head has been adjusted along the support 40 by means of the screw 59 it may be secured in adjusted positions by tightening the screw 71.

The head 55 is provided with a laterally extending portion 74 carrying the locating means and guide bushings for drills when the device is used as a drilling jig. In the present instance the lateral extension 74 is provided with two openings 75 extending vertically or at right angles to the plane of the work supporting table, and these openings are adapted to receive suitable hardened bushings 76 for guiding a drill or a center punch 77. Bushings of different internal diameters may be provided for use for different size drills. The ordinary center punch 77 having a conical end 78 may be used if desired, but in order to make the device more accurate I have provided an improved marker 79. This marker is an ordinary center punch one-half of which has been removed leaving a flat 80, or in other words the marker is semi-cylindrical. It will be apparent that as the flat 80 extends through the axis the point will always be in the plane of this flat so that if the flat is mounted either parallel to the direction of movement of the locating head 55 on the support 40, or parallel with the movement of the support 40 on the guides 28 and 29, the line made on the surface of the work by this point will always pass through the cen-

ter of the opening carrying this marker, the location of which center is accurately determined with respect to the locating head and the various scales. It will also be noted that no matter how carelessly this marker is ground the point will always be in the plane of the flat. I have provided means for easily and quickly locating this flat in a plane parallel with either the direction of movement of the locating head on the support 40 or at right angles to this direction and thus parallel to the direction of movement of the support 40 on the guides 28 and 29. For this purpose I provide a holder 81 also semi-cylindrical and of a size to fill the other half of the opening through which the marker 79 extends, and with the flat side 82 of the holder engaging the flat 80 on the marker, as shown in Figs. 5 and 6. A suitable pin 83 is carried by the end of the holder and is adapted to extend into either of two drilled openings 84 in the head 55. These openings are located ninety degrees apart and in such positions with respect to the pin 83 that when the pin 83 is in one of these openings the flat 80 is parallel to the direction of movement of the locating head on the support 40, and when the pin is in the other opening the flat is at right angles thereto.

In making the device the openings 75 are accurately located with respect to the center of the table when the straight edges 46 and 67 are on certain lines of their respective scales. It will then be apparent that by rotating adjusting screw 34 the positions of these openings may be adjusted in a direction parallel to the guides 28 and 29, and the support 40 may be secured in the adjusted position by tightening the screws 43 and 52. The opening may then be adjusted at right angles to the first adjustment by rotating adjusting screw 59, and the head secured in adjusted position by means of the clamping screw 71. The position of the opening 75 or the amount of movement from a determined position is indicated by the various scales, and the center of the opening desired to be drilled is accurately determined. If it is desired to draw straight lines on the surface of the work the end of the marker 75 may be drawn along the work in either direction by means of the adjusting screws, or the clamping screws 43 and 71 may be removed when the locating head 55 may be easily slid along its support 40, or the support 40 may be slid along its supporting guides 28 and 29.

By removing the holding pins 24 and 25 the table carrying the work may be adjusted to any angular position desired, and if during the location of the table the marker is mounted in the opening 75 any desired arc may be inscribed on the surface of the work. Thus by the combination of the three adjustments provided any desired point may be easily and quickly located on the surface of the work.

Having thus set forth the nature of my invention, what I claim is:

1. In a device of the character described, a base, a work supporting table rotatably mounted on said base, means for securing the table in different angular positions, a locating head, means for mounting the locating head comprising supports parallel with the plane of the table and extending at right angles to each other, the head being adjustably mounted on one of the supports and said head support being adjustably mounted on the other support so that the head may be moved in a plane parallel with the table and in lines in this plane at right angles to each other, and means for securing the head in adjusted positions in both lines of adjustment.

2. In a device of the character described, a base, a work supporting table rotatably mounted on the base, a locating head, a support above the table on which the head is adjustably mounted for movement in one direction, supports on which said first support is mounted for movement at right angles to the direction of movement of the head on its support, means for securing the table in different angular positions, and means for securing the head and its support in adjusted positions.

3. In a device of the character described, a base, a work supporting table rotatably mounted on the base, means for securing the table in different angular positions, parallel guides above the base at opposite sides thereof, a support extending between said guides and at right angles thereto and mounted for adjustment longitudinally of said guides, a locating head slidably mounted on said support, and means for securing the support and the head in adjusted positions.

4. In a device of the character described, a base, a work supporting table rotatably mounted on the base, means for securing the table in different angular positions, parallel guides above the base at opposite sides thereof, a support extending between said guides and at right angles thereto and mounted for adjustment longitudinally of said guides, a screw carried by one of said guides and having threaded engagement with said support, means for rotating the screw to adjust the support on the guides, a locating head slidably mounted on the support, a screw carried by the support and having threaded engagement with said head, and means for rotating said latter screw to adjust the head on the support.

5. In a device of the character described, a base, a work supporting table rotatably mounted on the base, means for securing the table in different angular positions, said

table and base being provided with cooperating scales, work securing means on said table, parallel guides above the base at opposite sides thereof, a support extending between said guides and at right angles thereto and mounted for longitudinal adjustment of said guides, a screw carried by one of said guides and having threaded engagement with said support, said support and one of said guides being provided with cooperating indicating scales, means for rotating the screw to adjust the support on the guides, said screw and the guide being provided with cooperating indicating scales, a locating head slidably mounted on the support, said head and support being provided with cooperating indicating scales, a screw carried by the support and having threaded engagement with the head, and means for rotating the latter screw to adjust the head on the support, said screw and support being provided with cooperating indicating scales.

6. In a device of the character described, a base, a work supporting table rotatably mounted on the base, means for securing said table in adjusting positions, said base and table being provided with cooperating indicating scales, a locating head, supporting means for said head above the table comprising supports parallel with the plane of the table and extending at right angles to each other, the head being adjustably mounted on one of the supports and the head support being adjustably mounted on the other supports and arranged to allow movement of the head in a plane parallel with the table and in lines in said plane at right angles to each other, means for adjusting the head along said lines, and indicating means for indicating the position of the head.

7. In a device of the character described, a base counterbored on its upper side, a work supporting table mounted to rotate in said counterbore, with its top surface substantially flush with the top of the base and resting adjacent its periphery on the bottom of the counterbore, work securing means carried by said table, means for securing said table in adjusted positions, there being cooperating scales carried by the base and table to indicate the position of the table, and a locating head mounted above the table to move in a plane parallel therewith.

8. In a device of the character described, a base, work securing means carried by the base, a locating head, means for mounting said head for movement in a plane parallel with the base and in lines in said plane at right angles to each other, a semi-cylindrical pointed marker carried by said head in a position normal to the base, and means cooperating with the flat side of said marker for securing said marker in positions with its flat side parallel with either of said lines of movement of the head.

9. In a device of the character described, a locating head, means for mounting the head so that it may be moved in directions at right angles to each other, a semi-cylindrical pointed marker carried by said head, and means cooperating with the flat side of said marker for securing said marker in positions with its flat side parallel with either of said directions of movement.

10. In a device of the character described, a movably mounted locating head having a cylindrical opening, a semi-cylindrical pointed marker mounted in said opening, a semi-cylindrical holder in the other half of said opening with its flat side engaging that of the marker, and cooperating pin and socket means carried by the head and holder arranged to secure said holder in positions ninety degrees apart about the axis of said opening.

11. In a device of the character described, a base, a work supporting table rotatably mounted on the base, said table being provided with a series of openings spaced apart a distance corresponding to one or more degrees, said base being provided with a pair of openings in the planes of the openings in the table and spaced from each other a distance corresponding to a given number of degrees plus a fraction of a degree, and a pin for inserting in aligned openings to secure the table in adjusted angular positions.

In testimony whereof I affix my signature.

IVER A. P. ANDERSON.