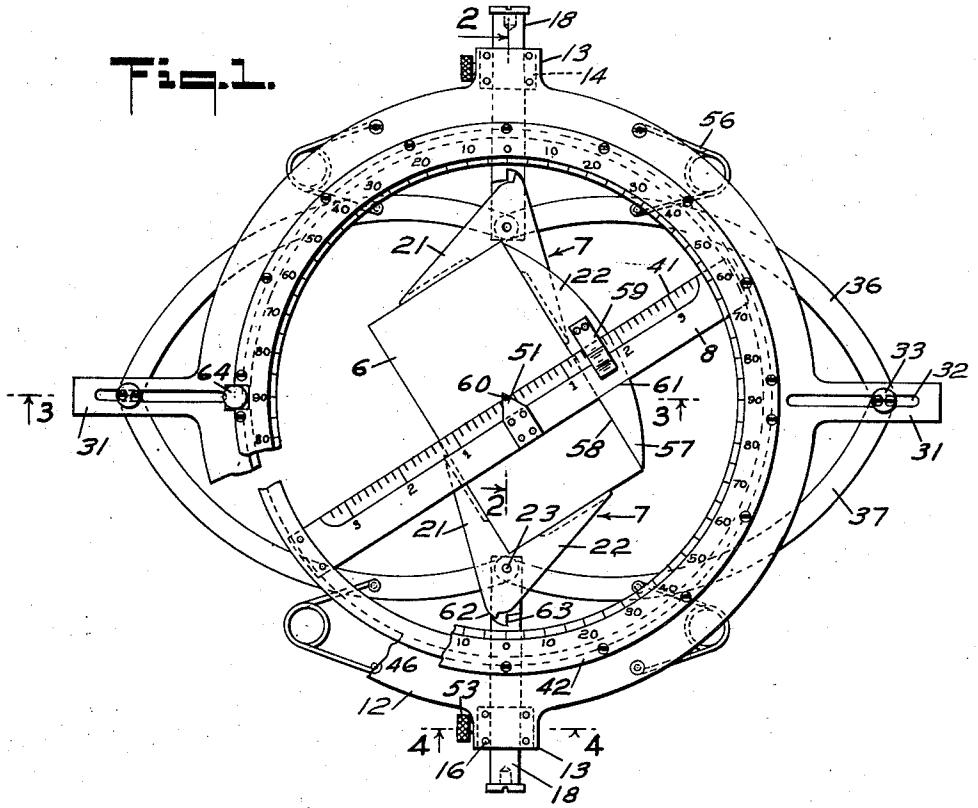
May 20, 1958 B. O. BUTI 2,835,045

LAYOUT TOOL

Filed Dec. 24, 1954

Fig. 1.



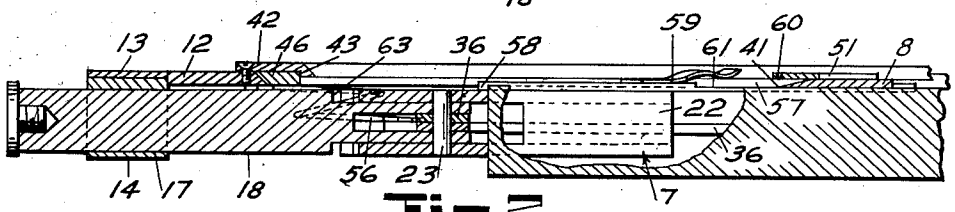


Fig. 2.

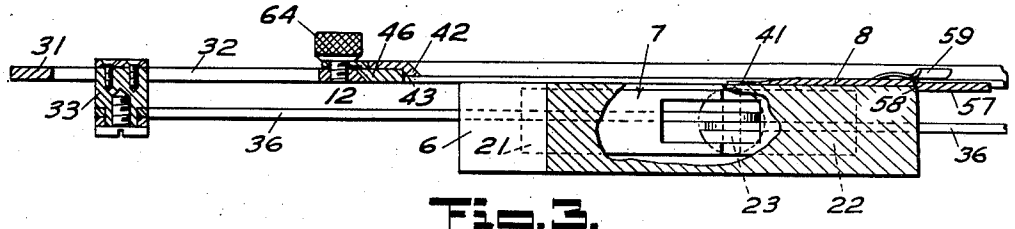


Fig. 3.

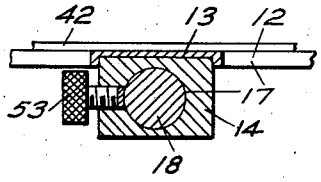


Fig. 4.

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LAYOUT TOOL

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8 Claims. (Cl. 33—191)

This invention relates to tools or devices usable by tool or die makers or the like for laying out centers, axes, angles, etc. directly on the metal or other work on which the pattern or layout is to be made. More particularly, the invention relates to such a device adapted to receive a rectangular, circular or other formed work piece and to accurately position centers or axes thereon.

As is well known in the art, in many instances a machinist, tool and die maker or other artisan is given a circular disk or a small rectangular or square plate and is required to perform certain operations of critical dimension on the work. Usually, this requires the obtaining of centers or axes from which the necessary operations may be performed. For example, in the case of a circular blank, it is common for the draftsman preparing the working drawing to locate certain apertures or the like as being a certain distance from the center of the circle with the respective apertures having some particular angular disposition relative to each other. It will be appreciated that the location of the center on a circle or axes or the like on a rectangular block can become relatively complex and require a particular knowledge of mathematics. Thus, numerous workmen will frequently make mistakes in laying out centers or the like on the work and thereby occasion not only a loss of the work itself but a more expensive loss of working time.

Accordingly, it is an object of the present invention to provide a tool adapted to receive a circular or rectangular work piece or blank, in which means are provided for rapidly and accurately locating the center of the blank.

Another object of my invention is to provide a device of the character described in which substantially all of the necessary dimensions for further work on the blank may be easily located and indicated on the surface thereof without removing the blank from the tool.

A further object of the invention is to provide a device of the character described which is simple in operation but which practically eliminates any opportunity for making mistakes.

Yet another object of this invention is to provide a tool of the character described in which means are incorporated for readily determining angular as well as lineal relationships between various portions of the work.

The invention possesses other objects and features of advantage, some of which, with the foregoing, will be set forth in the following description of the preferred form of the invention which is illustrated in the drawing accompanying and forming part of the specification. It is to be understood, however, that variations in the showing made by the said drawing and description may be adopted within the scope of the invention as set forth in the claims.

Referring to said drawing:

Figure 1 is a top plan view of the apparatus of the present invention shown in operative position on a rectangular work piece.

Figure 2 is a cross-sectional view taken substantially in the plane indicated by line 2—2 of Figure 1.

Figure 3 is a cross-sectional view taken substantially in the plane indicated by line 3—3 of Figure 1.

Figure 4 is a cross-sectional view taken substantially in the plane indicated by line 4—4 of Figure 1.

For purpose of illustration, the tool of the present invention is shown in operative relationship on a rectangular metal work piece or blank indicated by the numeral 6, but as will be later made clear, the work piece or blank can be circular and equally efficient results may be obtained by means of the tool. In broad terms, the tool comprises a pair of radially movable clamp members generally indicated by the numeral 7 which are adapted for engaging diametrically opposed portions of the work. A cross bar 8 is provided as a diameter of the circle from which the clamps are positioned and is arranged to rotate while maintaining a diametrical position whereby the center of the cross bar 8 is at all times directly at the center of the aforementioned circle. Therefore, if the clamps are caused to operate to move the work piece into a centered position, the center of the cross member will automatically and positively be positioned immediately over the center of the work piece. This feature is utilized in obtaining this center point. As will be later explained this cross bar 8 is also utilized in laying out the normal axes of a rectangular member or work piece and likewise utilized for laying out opposed diameters on a circular blank or work piece.

In construction, the tool includes an annular ring 12 provided at diametrically opposed portions with substantially coplanar lips 13 formed integrally therewith. Preferably, the lips 13 are provided with a generally downwardly directed channel shaped form as best illustrated in Figure 4 so as to snugly receive a block 14 which may be secured thereto by screws 16 or the like. The blocks are provided with diametrically aligned bores 17 in which are mounted tubular slide rods 18 of sufficiently large diameter to permit only axial movement thereof in the bore without any displacement in a radial direction. Thus, the two rods 18 are capable of sliding movement from and towards each other along a common diameter of the annular member 12.

The work clamp members 7 are carried on the innermost portions of the rods 18 and are arranged to engage the work at opposed portions thereof. Where two clamping members are used, it is preferable that they be constructed of generally V-shaped configuration with the legs 21 and 22 thereof defining an enclosed right angle. It will be noted that the clamp, adjacent to apex of the V is provided with a pivot pin 23 by means of which the clamp is pivotally attached to the rod 18. By virtue of this rotational or pivotal mounting of the clamps on the diametrically opposed rods, it is possible, where a rectangular or square work piece is inserted in the apparatus, to position each of the clamps at a corner of the work piece with the legs of the clamp extending along all four sides of the work. However, as was previously mentioned, it is necessary for the work piece to be accurately centered within the circle 12 and therefore, it is essential that the clamps be moved in synchronism from and towards each other.

In order to accomplish the foregoing, the following construction is preferably employed. As will be noted, at diametrically opposed portions of the annular ring 12, and at right angles to the axis of the rods 18, I provide a pair of tongues 31 each having a diametrically extending slot 32 therein. A short rod 33 is positioned for sliding movement in the slots 32 and such rods have a radially reduced portion thereon arranged to engage the opposed faces of the slots whereby the rod is capable of only

radial movement in such slots. Pivotally attached to each rod **33** is an arcuate arm **36** and an arcuate arm **37**, the distal ends of which are pivotally connected to the respective pins **23** on which the clamps are carried. From the foregoing it will be appreciated that movement of one of the rods **18** will effect a corresponding movement of its diamertically opposed rod by virtue of the linkage **36** and **37** and the rods **33** sliding in the slots **32**. Thus, at all times the pivot point **23** of each of the clamps will be positioned at exactly the same distance from the center of the ring **12**. Therefore, if a rectangular work piece is snugly engaged by the V-shaped clamps in the manner indicated in Figure 1 of the drawing, the center of the work piece will automatically and accurately be positioned at such center of the ring. Accordingly, the portions of the tool presently to be described may be brought into play for laying out the necessary points or axes on the upper surface of the piece as may be required.

The cross bar **8**, previously discussed, has an edge **41** which constitues a diameter of the ring **12**, and the bar is rotatably mounted on the ring **12** in any suitable manner, such as by providing an inner annular extension **42** screwed or otherwise attached to the ring and forming with the latter an undercut portion **43** for slidably receiving a ring **46**. The ends of the bar **8** are screwed or otherwise secured to the undersurface of ring **46** whereby edge **41** will at all times constitute a diameter of the extension ring **42** as well as of ring **12**. Also, the center of bar **8** is provided with a pointed indicator **51** whereby the center of the piece may be readily ascertained.

Once the work piece is centered by the clamps, the same may be clamped in this position by means of screws **53** which enter the blocks **14** and bear against the outer faces of the rods **18**. In other words, the member **53** acts as set screws for locking the clamps in their proper operative position. Also, to facilitate use of the apparatus the arcuate links or arms **36** and **37** are normally urged towards their central position by means of springs **56**. These springs are sufficiently strong to insure proper seating of the blocks on the work piece until the set screws may be tightened but it will be appreciated that with the set screws in their loose position the operator may manually move the rods **18** outwardly causing the links **36** and **37** to move against their normal spring pressure so as to permit insertion of the work piece between the clamps.

With the work piece in its locked position between the clamps, it is possible to lay out on the surface thereof any desired dimensions that may be required. Usually, the first operation will be to find the axes of the pieces and this is accomplished in the following manner. Obviously, as the cross bar **8** and its scribing surface **41** may be positioned at any relative angle to the piece the bar will not necessarily be positioned along an axis of a rectangular piece. However, to so position the bar I provide a clip-like member **57** which is provided with a flat working surface **58**. Member **57** is provided with a spring clip **59** or any other suitable means for positioning the member on cross bar **8** at any position along the length of the latter. Also, the clip is arranged with a transverse surface **61** which is arranged to seat on the edge opposite to edge **41** of the cross bar when the cross bar and member are at right angles to one another. Thus, in order to provide the transverse axis of the rectangular work piece **6**, the member **57** is caused to approach the longitudinal edge of the work piece until the surface **58** thereof is contiguously related to such edge. The cross bar **8** is then rotated until the bar and member **57** are disposed at right angles with the surface **58** still in engagement with the edge surface of the work. At this point, the edge **41** of the cross bar will overlie the transverse axis of the work piece. In order to find the other axis, it is only necessary to rotate the cross bar **8** through an arc of 90 degrees, and this may be effected by providing a protractor on the upper surface of the extension ring **42** as illustrated in Figure 1 of the drawing. The rods **18** are always positioned at what might be called a zero degree point and the tongues **31** always positioned at a 90 degree point. The protractor will thus read from zero to 90 in both directions of the rod **18**. Simple arithmetic will indicate the 90 degree rotation of the cross bar in order to have the edge **41** thereof overlie the longitudinal axis of the work along which a scribe line or the like may be indicated. With the axis scribed or otherwise marked on the upper surface of the work the scale provided on cross bar **8** may be utilized for locating any distances from the center. Also, to assist in the use of various types of instruments such as dividers, calipers, compasses or the like, the indicator **51** is provided with a tapered conical bore **60** which constitutes the center of the circle. This tapered bore provides a seat for the point of a divider or caliper for making arcuate or other measurements whereas the scale on cross bar **8** may be used for conventional longitudinal or transverse measurements.

From the foregoing description the operation of the tool in connection with laying out centers and the like on a rectangular block may be readily understood and the use of the tool in connection with a circular disk (not shown) will now be discussed. Assuming a circular or disk-like work-piece is positioned within the ring **12**, the clamps are brought to bear against the outer peripheral surface of the disk. By virtue of the V-shaped configuration of the clamps, the legs **21** and **22** of the respective clamps will engage the disk periphery at four spaced points thereabout and thereby secure the same in position. However, it must be appreciated that as the clamps are freely pivoted at **23**, there would be a tendency for the clamps to slide along such periphery and possibly result in misalignment or other inaccuracies appearing in the layout. Accordingly, means are provided for locking the clamps against rotation thereof in one direction. As will be noted, the rod members **18** are provided with an upwardly extending notch **63** having a shoulder thereon and arranged to receive a supplemental projection **62** at a point on the clamp member. When rectangles are being used it will be noted that the projection does not necessarily seat in the notch **63** but where circles are used the clamps are moved until this interengagement occurs, at which time there is no further possibility of additional movement of the clamps. Thus, with the clamps in position the cross bar **8** may be used to lay out a diameter on the upper surface of the work piece of circular form and the aperture or bore **60** will as above mentioned directly overlie the center point of the disk. By rotating the cross bar 90 degrees, by using the protractor scale on the extension **42**, cross diameters may be positioned, and any angular disposition relative to a single diameter may likewise be readily plotted.

In order to lock the bar **8** in a desired position, a set screw **64** is provided whereby the beveled inner periphery of ring **12** bears against the beveled outer periphery of ring **46**. By locking ring **46** in place, the cross-bar **8** carried thereby will likewise be secured in position.

It will be noted that the notch and projection are disposed at a substantial distance from the pivot **23**. If this locking arrangement was closer to the pivot, any error in the machining of the tool, and particularly the clamp, would result in a substantial variation at the distal end of the clamp legs. However, by having the lock positioned as remotely as possible from the pivot, the error, if any is present, will not be increased to any substantial extent at the leg ends.

From the foregoing, both the construction and operation of the tool for both rectangular and cylindrical work pieces will be understood. It will be appreciated, however, that if extreme accuracy was desired, it would be possible to use four sets of clamps rather than the two

sets illustrated. In such a circumstance there would be additional pairs of arcuate legs 36 and 37 mounted on a slide normal to the tongues 31. Likewise, if four clamps were used it would not be necessary to have the clamps per se of V-shaped configuration as straight lugs or the like could be used. This would be possible as the lugs or blocks could lock on a circle at four separate points or engage the four separate sides of a rectangular work piece. Where four lugs would be used it would be possible to then eliminate the right angle projector or element 57 which clamps to the straight edge or cross bar 8.

While the device of the present invention is relatively simple in construction and operation it fulfills a long needed requirement in the tool and die trade and has been found to greatly reduce the time required and possibility of error by workmen who are required to lay out patterns or the like on work pieces.

What is claimed is:

1. A layout tool comprising an annular support member, a pair of diametrically opposed clamp elements slidably engaged with said member and movable selectively from and towards each other, means interconnecting said elements whereby each of said elements will move inwardly and outwardly and to the same extent as the other of the elements, a straight edge constituting a diameter of said annular member rotatably carried by the latter, and means defining a center on said straight edge, said center always being positioned at the center of said annular member.

2. Apparatus as set forth in claim 1 in which said interconnecting means includes a pair of arcuate links pivotally attached to said elements adjacent one end thereof and slidably mounted on said annular member adjacent the other end thereof for diametrical movement normal to the axis of movement of said clamp elements.

3. A layout tool of the character described comprising an annular ring member, means on the under side of said ring member defining a pair of opposed bores lying on a diameter of said ring, a pair of rods slidably mounted in said bores for diametrically opposed movement therein, means defining a diametrically extending slide on each of two sides of said ring member in right angular relationship to the axis of said bores, two pairs of arcuate links each having one end attached to one of said rods and the other end mounted for sliding movement in one of said slides whereby said rods will be caused to move in synchronism, work piece clamping members carried on the innermost ends of said rods, a straight edge lying on a diameter of said ring member and slidable relative thereto while maintaining its diametrical relationship to said member, and means normally urging said rod members and said clamps towards their radially innermost positions.

4. Apparatus as set forth in claim 3 including means for locking said rod members in selected positions of radial displacement.

5. Apparatus as set forth in claim 3 in which said clamp members are of generally V-shaped configuration and are pivotally mounted adjacent the apex thereof on said rod members.

6. Apparatus as set forth in claim 3 including a pointed element overlying the center of said straight edge and having a conical bore therein, with the axis of said bore lying on the center of rotation of said ring member.

7. A work piece layout tool comprising an annular ring member, a pair of diametrically opposed rod elements slidably carried by said ring member and movable selectively from and towards each other along a diameter of said member, a pair of slides disposed in diametrically opposed relationship, with each slide being positioned normal to the axis of said rods, a pair of arcuate links operatively engageable with each of said slides, each of said links having one end thereof pivotally attached to one of said rods and the other end slidable in one of said slides, and means defining a straight edge lying on a diameter of said ring member and slidable therealong at various angularly related diameters.

8. A layout tool of the character described comprising an annular ring member, means on the under side of said ring member defining a pair of opposed bores lying on a diameter of said ring, a pair of rods slidably mounted in said bores for diametrically opposed movement therein, means defining a diametrically extending slide on each of two sides of said ring member in right angular relationship to the axis of said bores, two pairs of arcuate links each having one end attached to one of said rods and the other end mounted for sliding movement in one of said slides whereby said rods will be caused to move in synchronism, work piece clamping members pivotally connected to the innermost ends of said rods, means for limiting pivotal movement of said clamping members in one direction of rotation, and a straight edge lying on a diameter of said ring member and slidable relative thereto while maintaining its diametrical relationship to said member.

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