April 21, 1964 F. S. SCHILER 3,129,512

THREE DIMENSIONAL LAYOUT DEVICE

Filed July 27, 1959 3 Sheets-Sheet 1

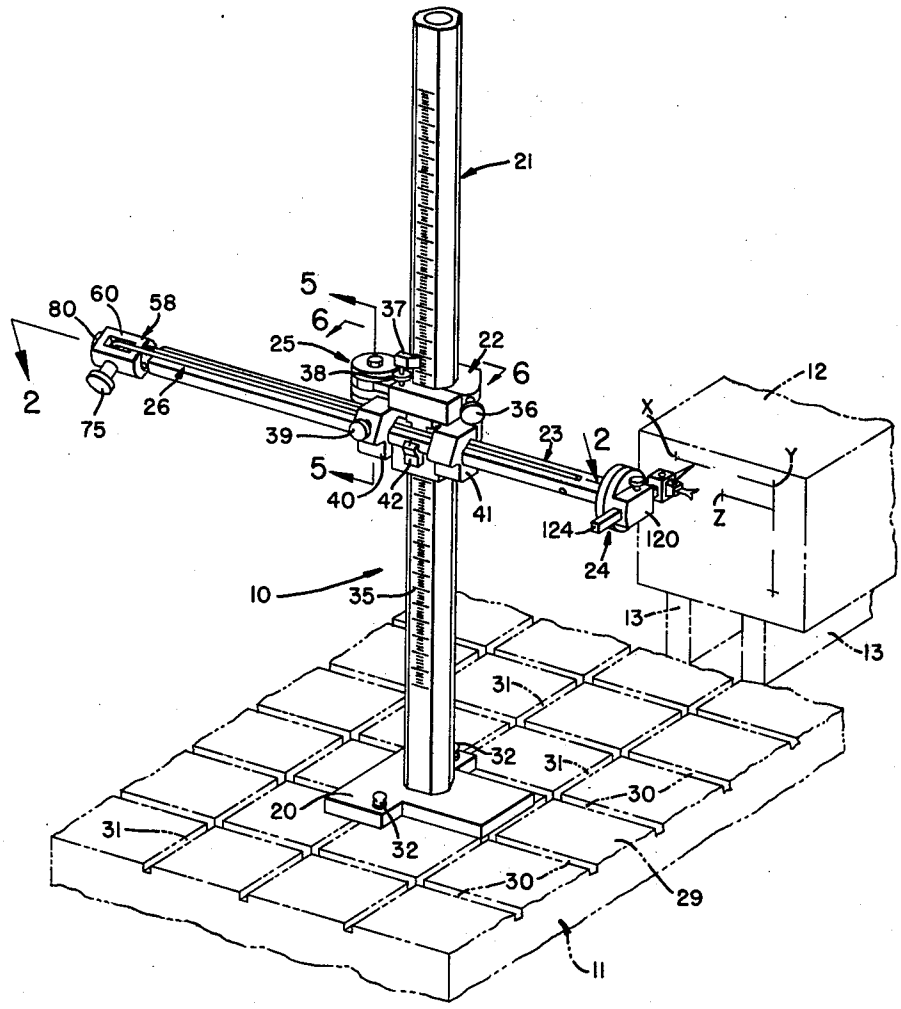


FIG. 1

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April 21, 1964 F. S. SCHILER 3,129,512

THREE DIMENSIONAL LAYOUT DEVICE

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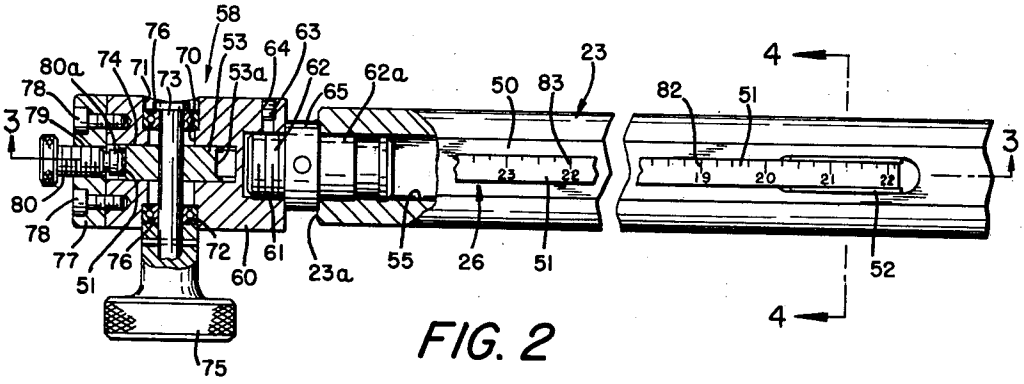


FIG. 2

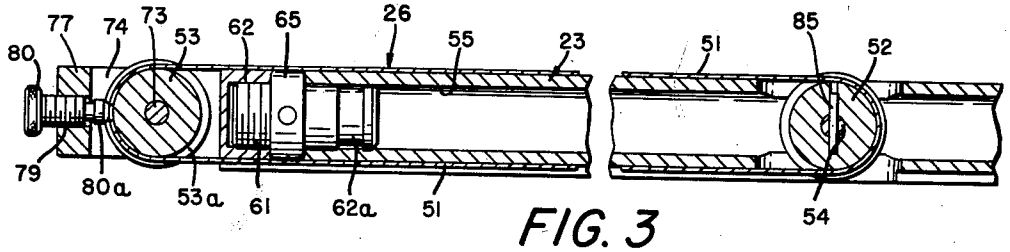


FIG. 3

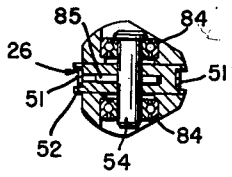


FIG. 4

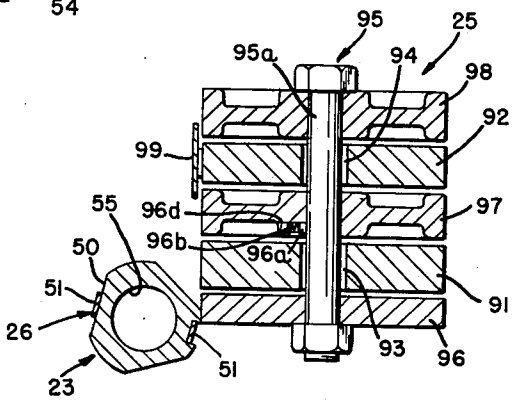


FIG. 5

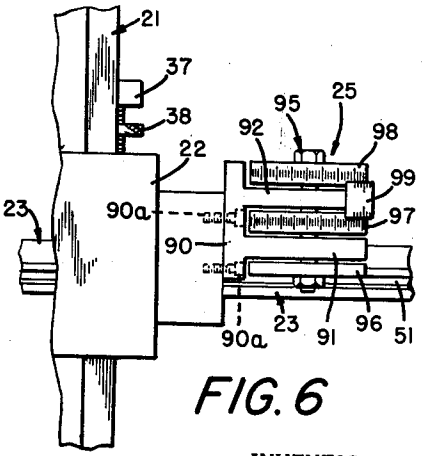


FIG. 6

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THREE DIMENSIONAL LAYOUT DEVICE

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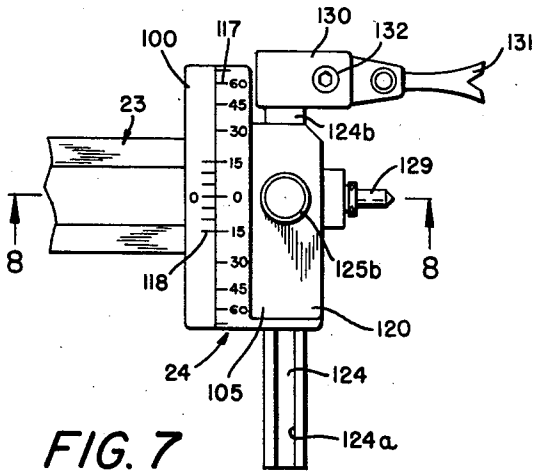


FIG. 7

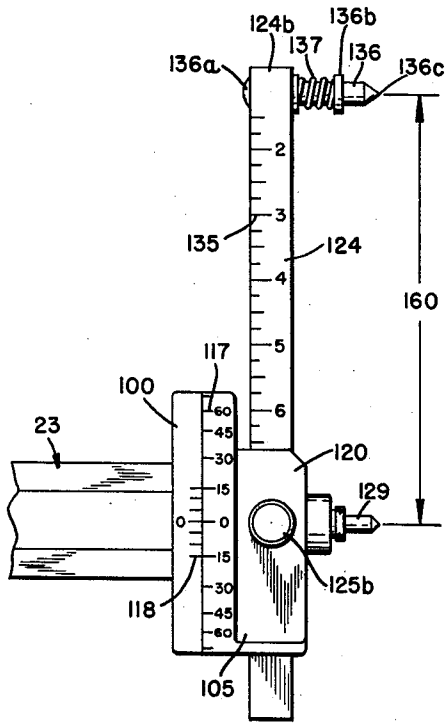


FIG. 9

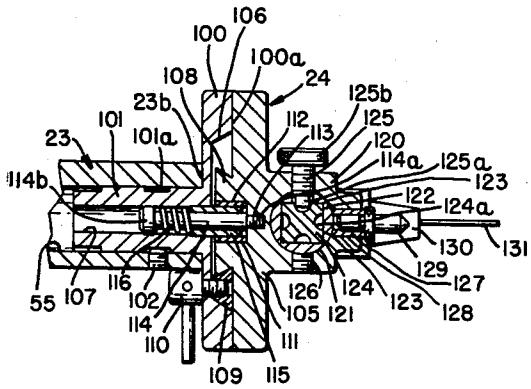


FIG. 8

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Patented Apr. 21, 1964

3,129,512

THREE DIMENSIONAL LAYOUT DEVICE

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Filed July 27, 1959, Ser. No. 829,936
3 Claims. (Cl. 33—18)

This invention relates to layout devices for marking locations on planar surfaces and in particular has reference to a new and improved type of layout device that is capable of making a layout in the three dimensional planes of a solid object.

In the art of machining heavy castings, for example, a foundry or other source normally delivers the rough casting to the machine shop where the same is to be machined to final dimension. It has been the experience of machine shop operators that castings of this general type are often inaccurately cast and such inaccuracy normally will not show up until after considerable time has been spent to effectuate preliminary layout and machining operations.

In applicant's copending application, Serial No. 723,266, filed March 24, 1958, now Patent No. 3,069,778, there was disclosed a layout device of the above character wherein an upright standard was provided on a base member that coacted with grooves provided in a surface table so as to be shiftable thereon. The upright standard slidably received a bracket that, in turn, received a cross arm that was shiftable transversely thereof for the purpose of laying out dimensions in a plurality of planes. This device featured the use of a calibrated standard and a calibrated cross arm, both of which coacted with a mounting bracket having scale indicia markings thereon so that the location of the scribing head could be determined either with respect to the surface table or the upright standard as desired.

In applicant's copending application, Serial No. 766,051, filed October 8, 1958, now abandoned, there was disclosed an improvement over the above described layout device wherein a linear measuring attachment was provided for use with the same, with this linear measuring device permitting the layout machine to be used over the wider range of dimensions.

While the above described layout machines have been successful, it has been discovered that improved accurracy and ease of use can be achieved by incorporating certain inventive features to the basic concept of the above referred to copending applications.

Specifically, it has been discovered that greater ease of dimension taking can be facilitated by employing a tape mechanism in conjunction with the cross arm, with the tape being movable relatively of the cross arm so that the same can be set at a zero reading regardless of the position of the cross arm on the standard. In this fashion, direct readings can be taken of the horizontal shifting of the cross arm.

Secondly, it has been discovered that if a further direct reading dial is mounted on the adaptor bracket and has a movable portion thereof in contact with the cross arm, that motion of the cross arm relatively of the support bracket will result in determination of readings on this direct reading scale, with the result that at all times an accurate and simplified method of obtaining direct readings is obtained.

Thus, by using the two direct reading scales in combination with each other, a device is provided that permits increased efficiency throughout the operation of the machine.

For example, if the center line of bore A is 12 inches from the center line of bore B, the scriber can be positioned on the center line of bore A and the sliding tape mechanism set at zero. At this time, bore B can be located by taking a direct reading of the tape scale. If there is another dimension such as bore C to be determined and it is known that bore C is three inches from bore B, the friction scale can then be employed to take a direct reading. As a result of the two direct reading scales employed, direct readings can at all times be taken.

As a still further improvement over the teachings of the above described copending applications, it has been discovered that the range of operation of the layout machine can be expanded if the scribing means thereof are made in the form of a calibrated socket, with such socket means permitting the scribing of circular dimensions in a plane normal to the axis of the cross arm and also permitting the laying out of angles in such a plane.

Production of an improved layout machine having the above advantages accordingly becomes the principal object of this invention, with other objects of the invention becoming more apparent upon a reading of the following brief specification, considered and interpreted in the light of the accompanying drawings.

Of the drawings:

FIGURE 1 is a perspective view of the improved layout device.

FIGURES 2 and 5 are transverse sections taken on the lines 2—2 and 5—5 of FIGURE 1.

FIGURES 3 and 4 are transverse sections taken on the lines 3—3 and 4—4 of FIGURE 2.

FIGURE 6 is a fragmentary elevation on the lines 6—6 of FIGURE 1.

FIGURE 7 is an enlarged elevational view of the improved socket means and showing one form of scribing tool received therein.

FIGURE 8 is a transverse section taken on the lines 8—8 of FIGURE 7.

FIGURE 9 is a view similar to FIGURE 7 but showing a different form of scribing tool received in the socket.

Referring now to the drawings and in particular to FIGURE 1 thereof, the improved layout tool, generally designated by the numeral 10, is shown positioned on a surface table 11 so as to provide layout dimensions on a casting 12 that is supported with respect to the surface table 11 by support blocks 13, 13.

In general, the layout device 10 includes a base 20 from which projects an upright standard 21 that is encircled by an adaptor bracket 22 that, in turn, slidingly receives a cross arm 23, with scribing means 24 being provided on one end of the cross arm 23 for the purpose of marking the casting 12, as indicated in FIGURE 1.

Additionally, a friction operated measuring device 25 and a tape operated measuring device 26 are provided for coaction with the cross arm 23, with the purpose of these devices being to give direct readings as to the distance between points X, Y and Z, for example, as will be described.

With regard to the detailed construction of the layout device 10, it suffices to say that the base 20, upright standard 21, adaptor bracket 22 and cross arm 23 are preferably of the same detailed construction recited in applicant's copending application, Serial No. 723,266 and, accordingly, for the purpose of clarity, it will suffice to give a general description of the operating functions only, with reference being had to the above referred to copending application for a detailed description of the component parts.

Accordingly, the surface table 11 is provided with a planar surface 29 that includes a first set of parallel grooves 30, 30 and a second set of parallel grooves 31, 31 that run at right angles to the grooves 30, 30 so as to

divide the surface 29 into a plurality of preferably square areas as shown in FIGURE 1 of the drawings. As before, the base 20 includes rectractable wheel means including knobs 32, 32 that serve to retract wheel members (not shown) with respect to either the grooves 30, 30 or 31, 31, with the wheel members being selectively receivable in either of the grooves when desired.

Also, scale indicia 35 are provided on the standard 21 and, as shown best in FIGURE 1, the adaptor bracket 22 substantially encircles the standard 21 and is movable relatively thereof by turning of knob 36, with micrometric scale 37 being adjustable by knob 38 to obtain readings on scale indicia 35. Similarly, a knob 39 serves to shift the cross arm 23 axially of the opposed support journals 40 and 41 that are components of the overall adaptor bracket 22, with scale 42 serving to provide a fixed point for determining readings on the cross arm 23.

Referring next to FIGURES 2 and 3 for a detailed description of the adjustable tape measuring means 26, it will be seen that the cross arm 23 has a flatted surface 50 across which a measuring tape 51 may be slidingly received as shown in FIGURES 2 and 3, with the tape 51 preferably being made endless so as to be capable of being played about spools 52 and 53; the arrangement being such that the spool 52 is mounted on pin 54 that extends between the opposed wall portions of the cross arm 23, while pulley or spool 53 is similarly journaled for rotational movement with respect to drive means 53, as will presently be described.

Accordingly and to this end, the preferred embodiment of the invention contemplates that the cross arm 23 will have an internal bore 55 extending between the opposed ends 23*a* and 23*b* (FIGURE 8) thereof. In this manner, drive means, indicated generally by the numeral 58, may be associated with the end 23*a*, while the socket means 24 may be associated with the end 23*b*, as shown in FIGURE 8.

Considering first the structure of the drive means 58, it will be seen that the same includes a block 60 having a bore 61 within which a threaded stud 62 may be received, with the projecting end 62*a* of stud 62 being received in bore 55. A set screw 63 is receivable in tapped aperture 64 for the purpose of locking the stud in bore 61, while a nut 65 is threaded on the stud 62 for scale tension adjustment purposes.

In addition to the aforementioned component parts, the block 60 further includes a cross bore 70 that is counterbored as at 71 and 72, at its opposed ends for the purpose of journaling therein a shaft 73, with pulley 53 being keyed or otherwise secured to shaft 73 so as to be rotatable therewith within the confines of slot 74. Additionally, and as indicated in FIGURE 2, the peripheral edge of wheel 53 is undercut as at 53*a* to define a track for the tape 51, while a turning handle 75 and bearings 76, 76 are also associated with the shaft 73 in known fashion to facilitate a rotational movement thereof.

For the purpose of locking the tape in any given position, a cover plate 77 is secured, as by bolts 78, 78, to one face of block 60, with the plate 77 having a threaded aperture 79 within which a threaded bolt 80 can be received, with end 80*a* of bolt 80 being intended to bear against the tape 51 that is received on wheel 53. In this fashion, the wheel 53 can be locked against rotational movement at any selected time.

Additionally, and for the purpose of obtaining direct readings in either direction, the tape 51 preferably includes two sets of indicia 82 and 83, with indicia 82 progressively increasing towards the right (FIGURE 2) from a zero point, while indicia 83 progressively increase to the left of FIGURE 2 from the same zero point (not shown).

Additionally, and as best shown in FIGURE 4, it is believed apparent that the pin 54 is similarly rotationally journaled with respect to arm 23, with bearings 84, 84 and pin 85 being employed in known fashion for the purpose of having the tape 51 drive spool 52 upon rotation of handle 75.

Referring next to FIGURES 5 and 6 for a detailed consideration of the friction drive means 25, it will be first seen that the same are supported by the adaptor bracket 22 and are frictionally engaged by the cross arm 23, with the arrangement of component parts being such that the device 25 includes a yoke 90 that is secured to the adaptor bracket 22 by bolts 90*a*, 90*a*, with the arms 91 and 92 thereof being provided with aligned apertures 93 and 94 through which the shank 95*a* of a bolt 95 may be passed. Keyed or otherwise secured to the shank portion 95*a* are a series of discs 96, 97 and 98, with each of these discs being frictionally engaged against shank 95*a* by plug 96*a*, spring 96*b* and set screw 96*d* (see FIGURE 5). In this fashion, the discs 96, 97 and 98 will normally move in unison relatively of yoke 90, but adjustment of the same on shank 95*a* can be made when desired. A scale 99 is fixed with respect to the arm 92 and in the preferred embodiment, two sets of graduations are provided thereon for respective coaction with indicia provided on the peripheral surfaces of the discs 97 and 98. In this fashion, direct readings can be taken from scale 99 against the indicia on either disc 98 or 97 and preferably the two sets of graduations on scale 99 run in opposite directions so that one set can be used to read movement of the cross arm to the right, while the other set can be used to read movement to the left.

In this manner, with the lower disc 96 disposed in frictional engagement with the outer surface of the cross arm 23, any movement of arm 23 axially will cause the discs 96, 97 and 98 to rotate in unison relatively of arms 91 and 92, as well as scale 99 so that a reading of travel of arm 23 will occur, with a direct reading being obtained if the graduations have initially been registered at zero. It is believed manifest that if the yoke 90 was mounted at right angles on head 22 that the same could be arranged so that the disc 96 engaged the standard 21 at which time readings of elevation above table level could be taken.

Considering next the socket means shown and described in FIGURES 7, 8 and 9 of the drawings, it has been previously indicated that the same are associated with the bore 55 that opens into end 23*b* of arm 23. Accordingly, and as best shown in FIGURE 8, a base plate 100 of generally circular configuration is shown provided with a projecting cylindrical extension 101 that is designed to be received within the bore 55, with set screw 102 serving to hold the member 101 in place therein, with the set screw 102 preferably riding in a cylindrical undercut 101*a* that is provided on the extension 101.

For the purpose of receiving socket head 105, the face 100*a* of a base plate 100 includes a cylindrical recess 106 having a tapered wall surface and communicating with a bore 107 that is provided in the extension 101. In this fashion, a cylindrical projection 108, extending axially of the socket head 105, can be received within the recess 106, with the walls of the recess 106 and projection 108 being preferably oppositely tapered so as to facilitate the use of a wedge clamp 109 that is operated by a handle 110 to lock the socket head 105 at any selected position on mounting head 100.

In view of the fact that the socket head 105 is designed to be concentrically rotated about the axis of the mounting head 100, as well as the axis of the bore 55 in cross arm 23, the same (socket head 105) is provided with a bore 111 within which a sleeve 112 can be received, with a tapped aperture 113 also being provided to receive the threaded end 114*a* of a pin 114. The pin 114 is encircled by a sleeve 115 that is press fit in bore 107, with spring 116 bearing against head 114*b* of pin 114, as well as the axial end of sleeve 115. In this fashion, the socket head may be rotated around its axis of concentricity with the axis of bore 55 and, accordingly, when indicia 117 and 118 are provided on the socket head 105 and the

mounting head **100**, the same can be used to measure angular variation, as is apparent from FIGURES 7 and 9 of the drawings.

For the purpose of adjustably receiving the scribing means **24**, the socket head **105** further includes an extension **120** that is provided with a bore **121** that extends between the opposed faces thereof, with a sleeve **122** preferably being received in the bore **121** and including a square opening **123** within which a shank **124** may be slidably received. In this manner, shank **124** is releasably retained in position with respect to sleeve **122** by set screw **125**, with the set screw **125** preferably including an end portion **125***a* that can be selectively received within any one of the grooves **124***a*, **124***a* that are provided in the faces of shank **124**. Thus, upon turning of the handle **125***b*, the portion **125***a* may be either inserted or withdrawn with respect to the shank **124**. A threaded aperture **126** is provided for locking sleeve **122** in bore **121** after proper aligning therebetween so that scriber **131** moves through the plane that coincides with the axis of bore **55**.

Also, a sleeve **127** is shown journaled within a bore **128** of extension **120** so as to receive a marking pin **129**, with marking pin **129** preferably being removable and being disposed on the concentric axis of bore **55**, extension **101** and socket head **105**. Again referring to FIGURE 7, it will be seen that the upper end **124***b* of shank **124** has secured thereto a head **130** that receives a scribing instrument **131**, with this instrument being pivoted around pin **132** so as to be swingable through an arcuate plane when desired.

In FIGURE 9, the shank **124** is modified to include graduations **135**, **135**, while the upper end **124***b* thereof is bored to receive a pin **136**, with this pin **136** having a head **136***a* and a shoulder **136***b* so that a spring **137** may normally urge the same to the extended position shown in FIGURE 9. Thus, the point **136***c* will always be urged into contact with the surface being scribed, even through the same may be irregular in contour. Thus, if it is desired to scribe a circle normal to the axis of rotation, a longer pin can be used and the circle scribed over the compound surface involved.

In use or operation of the improved layout machine, it will first be assumed that the component parts have been assembled as indicated in the drawings and with the scribing instrument thus positioned, the shank **124** may be set at any desired position in extension **120** (FIGURE 1) and positioned adjacent the point X, for example. At this time, the scribing instrument **131** can be swung through an arc so as to pass through point X.

Accordingly, and at this time, the set screw **80** can be backed off and the handle **75** rotated to bring the zero point of scale **51** into registry with the zero point of scale **42**, and when such a positioning has occurred, the device is ready for use.

Assuming the distance between X and Y in FIGURE 1 is 10 inches, the cross arm **23** can be moved by knob **39** until a reading of 10 is obtained on indicia **83** and, at this time, a mark can be scribed by instrument **131** through point Y and the same will have been located exactly 10 inches from point X. Assuming next that it is desired to locate the vertical line within which point Z of FIGURE 1 falls and the drawings on hand indicate that the dimension between Z and Y is 4½ inches. To obtain this plane, it is merely necessary that the graduations on disc **98** be set so that the zero indicia thereof coincides with the zero indicia on scale **99**, and upon rotation of the knob **39** in the proper direction, the arm **23** will move to the left of FIGURE 1, with the plane of Z being located when the indicia on disc **98** is at the 4½ inch mark.

In the event it is desired at any time to change scribing instruments, it is merely necessary to back off set screw **125**, at which time the shank **124** of one scribing tool can be removed, followed by insertion of a similar shank of a different scribing tool. In the event it is desired at any time to lay out angular surfaces in a plane normal to the axis of rotation of socket head **105**, it is merely necessary that the calibrations **117** and **118** be employed to mark off the angular distance and similarly, with respect to FIGURE 9, it is believed apparent that a radius can be obtained by merely setting the scale indicia **135** at the proper location with respect to the axis of the projection **120**. Thus, in FIGURE 9, the pin **136** will rotate around the axis of bore **55** at a distance 160 therefrom. It is believed apparent that if this dimension were 6¾ inches that a perfect circle could be scribed by merely urging the marking pin **136** into registry with the face and then rotating the same about the axis of the socket head **105**.

While a full and complete description of the invention has been set forth in accordance with the dictates of the patent statutes, it is to be understood that the invention is not intended to be limited to the specific embodiment herein disclosed.

Accordingly, where appropriate, modifications of the invention may be resorted to without departing from the spirit hereof or the scope of the appended claims.

This application is a continuation-in-part of copending application, Serial No. 723,266, filed March 24, 1958, now Patent No. 3,069,778.

What is claimed is:

1. A layout device for use on a surface table of the character described, comprising:
   - (A) a base having a planar surface that is slidably supported on said surface table;
   - (B) an elongate upright standard fixed to and projecting from said base at right angles to said planar surface;
   - (C) a mounting bracket carried on said standard in longitudinally shiftable relationship therewith;
   - (D) an elongate cross arm carried by said bracket in longitudinally shiftable relationship therewith;
   - (E) scribing means carried by said cross arm;
   - (F) scale means carried by said bracket and including
     - (1) a shank carried by said bracket,
     - (2) a first drum member rotatably carried by said shank
       - (*a*) frictionally contacting said cross arm
         - (1) whereby said drum will be rotated upon travel of said cross arm and said scribing means relatively of said standard,
     - (3) second and third drum members rotatably carried by said shank and
       - (*a*) whereby said second and third drum members are rotatable upon rotation of said first drum member
       - (*b*) and further having first and second zero indicia disposed on their respective peripheral edges and progressing in opposite directions,
     - (4) a third zero indicia
       - (*a*) fixed with relation to said bracket,
     - (5) said second and third rotatable drums being shiftable relatively of said bracket and said third zero indicia during periods of non-movement of said scribing means
       - (*a*) whereby said zero indicia of said second and third drums may be set in registry with said third zero indicia regardless of the position of said scribing means with respect to said column.

2. A layout device for use on a surface table of the character described, comprising:
   - (A) a base having a planar surface that is slidably supported on said surface table;
   - (B) an elongate upright standard fixed to and projecting from said base at right angles to said planar surface;

(C) a mounting bracket carried on said standard in longitudinally shiftable relationship therewith;

(D) an elongate cross arm carried by said bracket in longitudinally shiftable relationship therewith;

(E) scribing means carried by said cross arm adjacent one end thereof and including

(1) a socket head rotatable around the longitudinal axis of said cross arm relatively of said cross arm,

(2) an elongate shank

(*a*) carried by said socket head in a shiftable radially projecting condition with respect to the axis of said cross arm,

(3) a scribing instrument

(*a*) carried by the projecting end of said shank

(1) whereby said scribing instrument may pass through concentric circles having varying diameters with respect to the axis of said cross arm upon rotation of said socket head,

(4) first indicia carried by said shank

(*a*) whereby the diameter of said concentric circles can be predetermined,

(5) second and third indicia carried by said cross arm and said socket head respectively on adjacent edges thereof

(*a*) whereby the amount of arcuate movement of said scribing instrument can be measured upon rotation of said socket head.

3. The device of claim 2 further characterized by the fact that the said scribing means may be adjusted between coextensive and right angle relationship with respect to said shank whereby scribing may be effectuated in right angle planes.

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