

[54] **LAYOUT APPARATUS HAVING IMPROVED ANGULAR ADJUSTMENT MEANS**

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[52] **U.S. Cl.**..... **33/169 R**

[51] **Int. Cl.**..... **G01b 5/00**

[58] **Field of Search**..... **33/174 J, 174 R, 169 R, 33/76 R**

[56] **References Cited**

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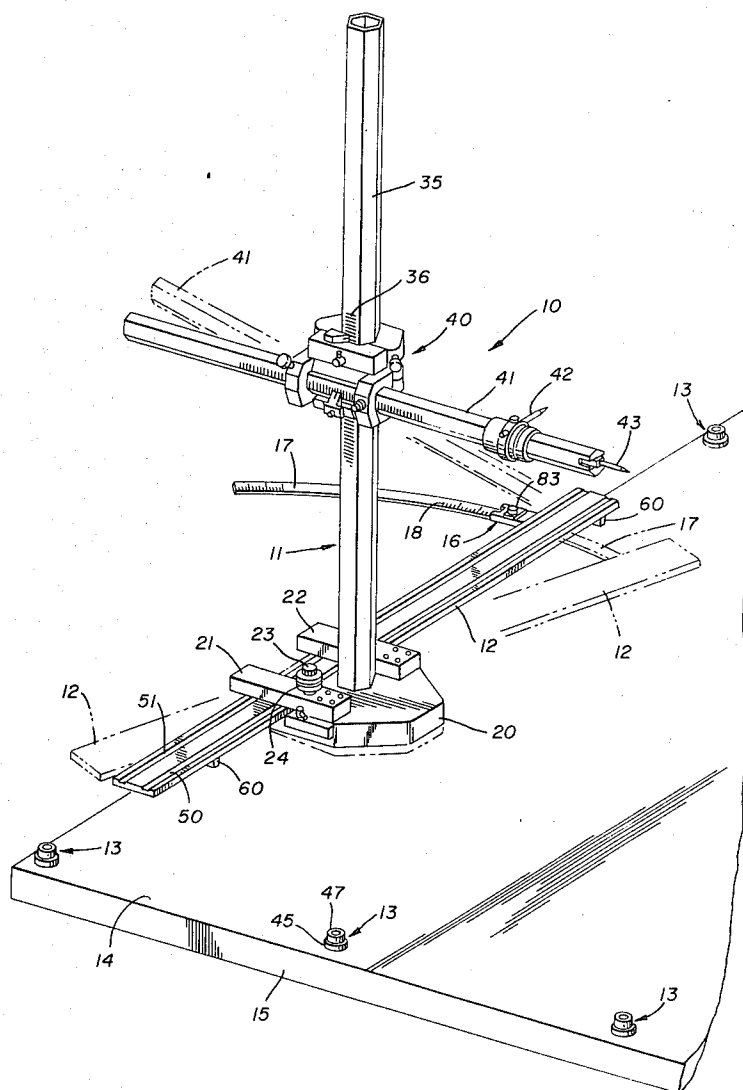
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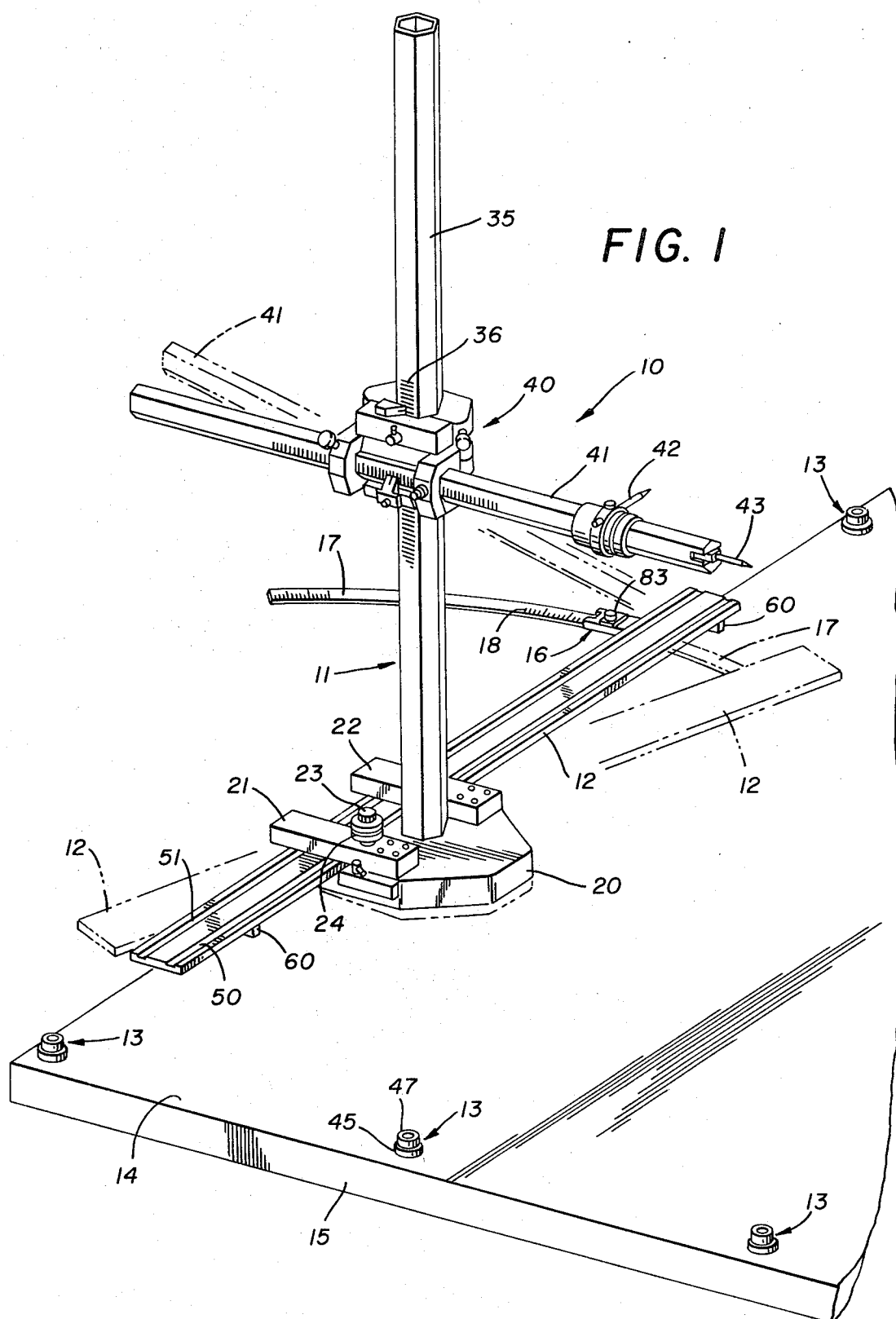
Primary Examiner—Harry N. Haroian
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[57] **ABSTRACT**

Layout apparatus having a base, an upright column, a bracket slidable on the column, and a crossarm slidable relatively of the bracket is improved by utilizing a guide rail assembly that can be selectively secured to at least one or more locating stations, with the guide rail assembly including an arm support member within which may be received an arcuate guide to thus permit the rail to be pivoted around one locating station to the desired degree of angularity required.

9 Claims, 7 Drawing Figures





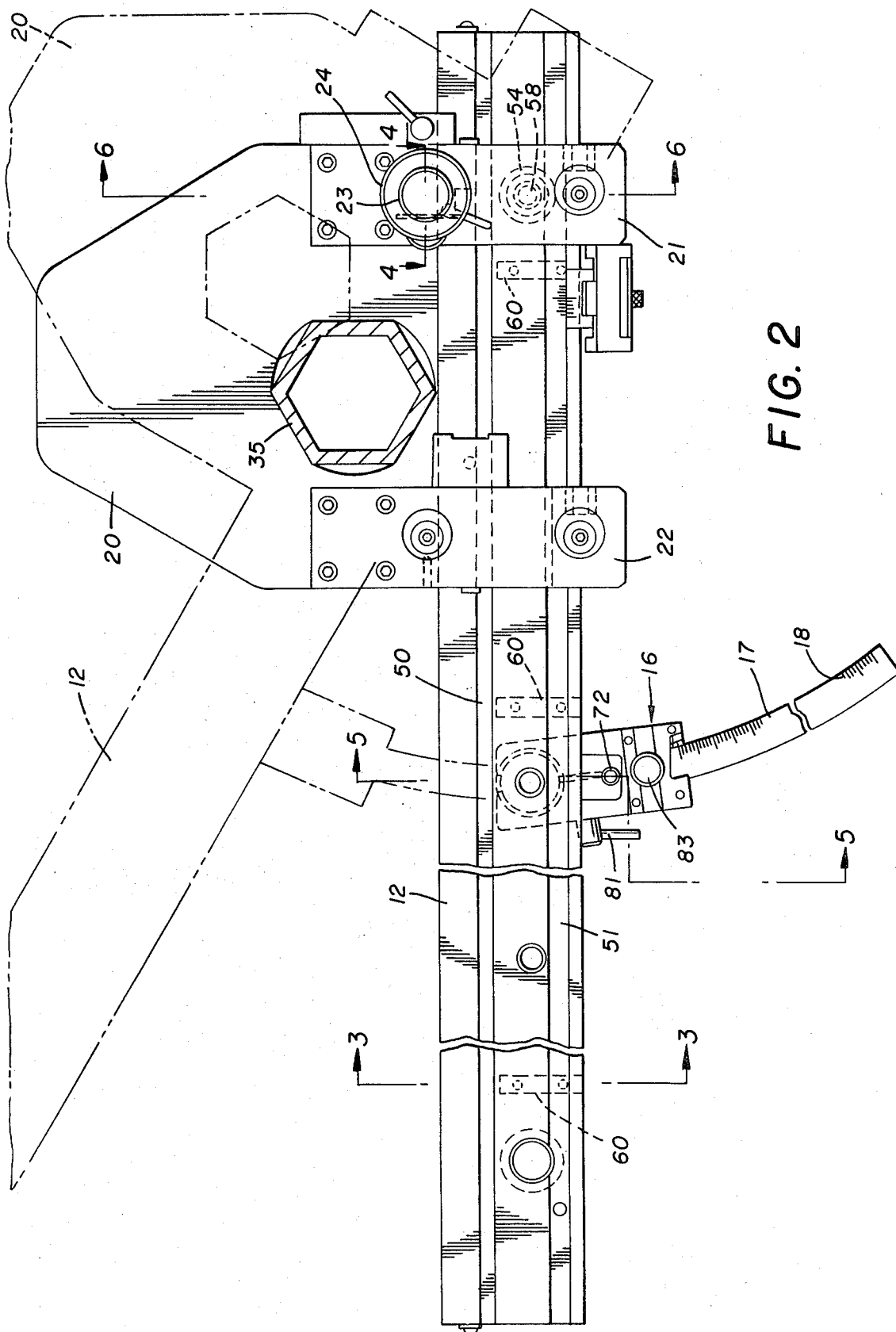


FIG. 2

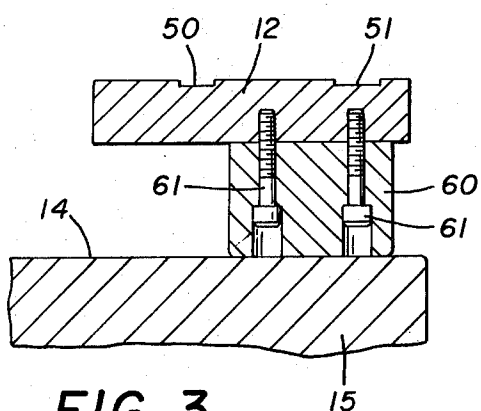


FIG. 3

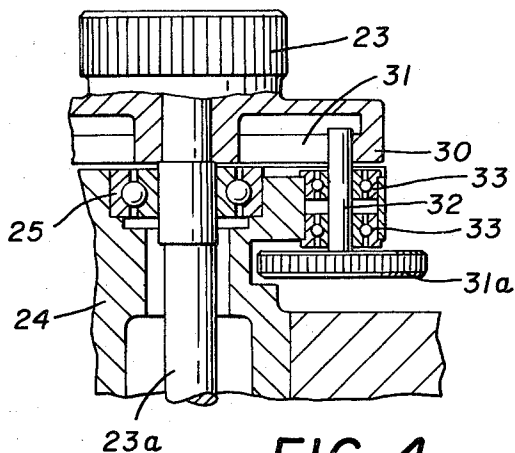


FIG. 4

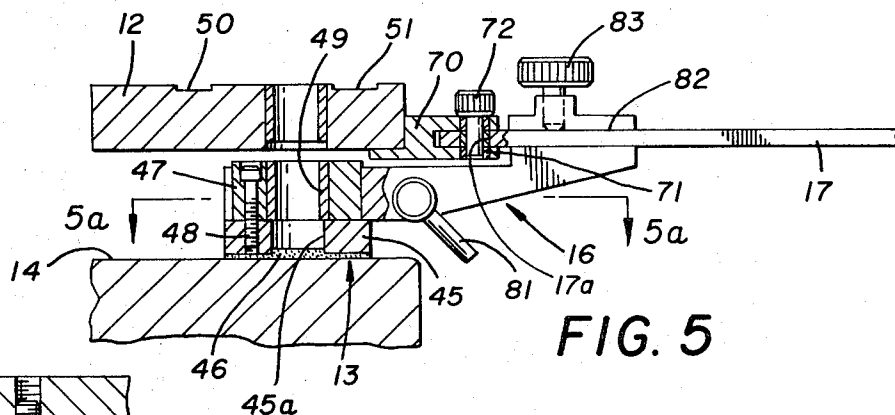


FIG. 5

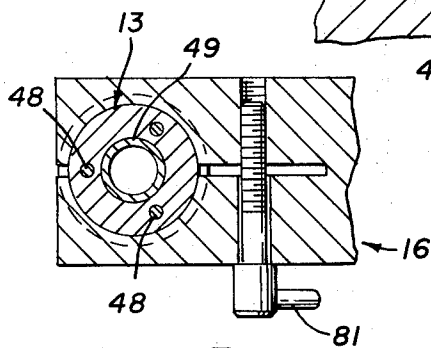


FIG. 5a

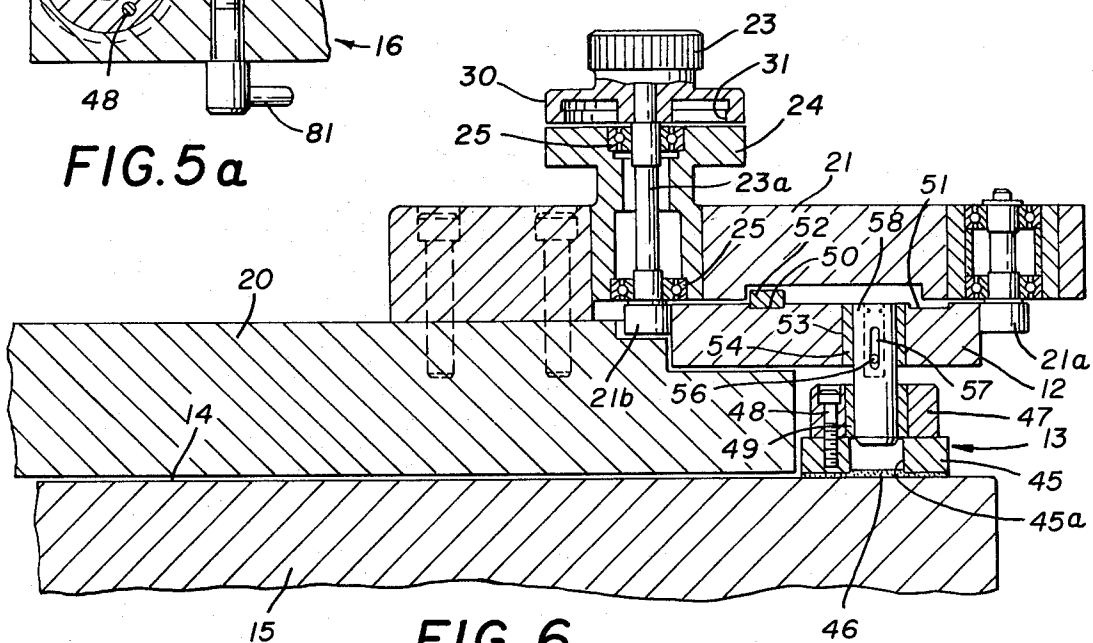


FIG. 6

LAYOUT APPARATUS HAVING IMPROVED ANGULAR ADJUSTMENT MEANS

BACKGROUND OF THE INVENTION

In Applicant's earlier patents noted above, there has been provided a layout machine that includes a surface table having a plurality of grooves within which may be received wheels that depend from a base member. An upright column receives a bracket that moves up and down on the column and further receives a crossarm member that is shiftable longitudinally of the bracket. Scribing means provided adjacent the end of the crossarm provide for three-dimensional marking as explained in the aforementioned patents.

While layout apparatus of the above description provide for accurate three-dimensional measurement, in layout it is often times necessary to lay out in additional planes that are angularly inclined with respect to the conventional X, Y, and Z axes.

In the past Applicant has utilized a rotary table of the type set forth in Applicant's prior U.S. Pat. No. 3,175,820, with the work being located on the table and with the table then being rotated to locate the work surface in the proper plane for measurement.

DESCRIPTION OF THE PRIOR ART

Applicant's own prior patents, U.S. Pat. Nos. 3,069,778; 3,129,512; 3,279,077; and 3,377,713, are believed to constitute the most pertinent prior art.

SUMMARY OF THE INVENTION

The invention consists of providing the work supporting surface of the work table with a series of locating stations that are laid out and accurately spaced given distances preferably around the perimeter of the table. A guide rail is then attached to one such station and can be secured with respect to another station if so desired so as to stabilize the guide rail with respect to the work table.

A support arm is releasably secured with respect to one of the locating stations associated with the guide rail, and this support arm carries an arcuate scale that is secured to the arm so that when the locating pin is removed in this area, the arcuate arm may be passed freely through the support and, by virtue of its attachment, to the rail to permit arcuate shifting or pivoting of the rail around the pivot point as defined by the locating station.

In this manner an infinite number of planes can have measurements scribed therein simply by adjusting the location of the guide rail to the proper position.

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

OF THE DRAWINGS

FIG. 1 is a perspective view of the improved layout apparatus.

FIG. 2 is a plane view thereof partly broken away and in section.

FIGS. 3, 4, 5, and 6 are sectional views taken respectively on the lines 3—3, 4—4, 5—5, and 6—6 of FIG. 2.

FIG. 5a is a sectional view taken on the line 5a—5a of FIG. 5.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the drawings and in particular to FIG. 1 thereof, the improved layout apparatus, generally designated by the numeral 10, includes a layout machine 11 adapted to slide along a guide rail assembly 12 that is secured with respect to one or more locating stations 13, 13 that are, in turn, fixed with respect to the work surface 14 of a work table 15. An arm support 16 supports a flat arcuate arm 17 having graduations 18 thereon, with the arm 17 being secured to the guide rail 12 and being movable relatively of the arm support 16 which is secured to a locating station 13, as best shown in FIG. 5 of the drawings.

Considering first the layout machine 11, the same includes a base 20 having the usual retractable wheels thereon of the type shown in Applicant's aforementioned earlier patents for the purpose of facilitating movement across the work surface 14 of table 15. Support arms 21 and 22 project from base 20 and are provided for the purpose of providing roller members 21a, 21b on support arm 21 (see FIG. 6) and with it being noted that a similar set of roller members will depend from the arm 22 so as to engage the opposed sides of guide rail 12 in a manner similar to that shown in FIG. 6 of the drawings. A knurled handle 23 is appropriately journaled within a housing 24 for connection with the roller 21b as shown in FIG. 6 of the drawings, with appropriate bearings 25, 25 being provided for this purpose and with the arrangement being such that rotation of the handle 23 will result in rotation of the roller 21b so as to drive the base 20 relatively of the rail 12 by virtue of the frictional forces involved.

While the just described handle 23 serves for rapid traverse movement to the approximate desired location, provision is also made for fine feed adjustment with the mechanism shown in FIG. 4 which will now be described.

In this regard the handle 23 is connected to a shaft 23a and this shaft is, in turn, fixed to a circular plate 30 having an internal face 31. The member 24 also supports, as shown in FIG. 4, an adjustment handle 31a having a shaft 32 that is appropriately journaled within bushings 33, 33, with the shaft 32 having its outboard end in engagement with the internal face 31 of circular plate 30, as clearly shown in FIG. 4 of the drawings. By this arrangement rotation of the knob 31a and shaft 32 will result in rotation of the member 30 which will, in turn, result in rotation of shaft 23a to achieve fine adjustment characteristics.

Referring again to FIG. 1, the layout machine 11 further includes an upright column 35 having graduations 36 provided thereon. A bracket 40 is received about the column 35 and moves up and down thereon in a manner described in complete detail in Applicant's earlier patents mentioned aforesaid. The bracket 40 further receives a crossarm 41 that moves longitudinally within the bracket in the manner described in Applicant's earlier patents mentioned aforesaid. Marking means 42 and 43 are also provided on crossarm 41 for the purpose of effectuating accurate layout operations as has also been described in Applicant's earlier patents aforesaid.

The locating stations 13,13 are best shown in detail in FIGS. 5 and 6 of the drawings, and in this regard it will be noted that each locating station includes a base 45 that is epoxied as at 46 or otherwise secured to the work surface 14 of table 15, with an opening 45a being provided therein for clearance of the shot pin to be subsequently described. An upper cylindrical plate member 47 is secured as by screws 48,48 to the top of plate member 45. This plate member 47 is provided with a bushing 49 within which the shot pin may be received.

Preferably the locating stations 13,13 are aligned at exact distances from each other so that the guide rail assembly 12 can be located accurately around the perimeter of the table.

Turning now to a detailed description of the guide rail 12, the same is of generally flat elongate ruler-like configuration and includes longitudinal grooves 50 and 51 within which one or more appropriate scales 52 (see FIGS. 3 and 6) may be inserted. Alternatively, a precision digital readout rack could be inserted in one or both grooves. Again referring to FIG. 6, the guide rail 12 also includes circular openings 53 within which a bushing 54 may be received, with the bushing 54 having a transverse pin 56 therein that may be received within the slot 57 of shot pin 58. By this arrangement the reduced neck portion of the shot pin may be lifted up to disengage the rail from the particular locating station 13 with which it has been associated. The exposed end of the pin can also be used as a handle.

Referring now to FIG. 3, it will be noted that the rail 12 further includes a support member 60 that is secured to the underside of the rail 12 by bolts 61,61 so as to provide support for the rail.

Referring now to FIG. 5, the rail 12 further includes an auxiliary support 70 that is appropriately secured, as by bolting or welding, to the rail and which further includes an opening 71 within which may be received a bolt or shot pin 72, as best shown in FIG. 5. The purpose of this arrangement is to permit the bolt or shot pin 72 to be passed through an opening 17a in one arcuate end of the arcuate arm 17 so that the arm 17 is, in effect, tied or fixed to the rail 12.

Referring now to FIGS. 2 and 5, the arm support bracket 16 is shown appropriately secured with respect to any given locating station 13 such as by being slipped over the same and tightened in place by the handle 81 which operates on the split end of bracket 16 as shown in FIG. 5a.

The bracket 16 further includes an arcuate slot 82 within which may be received the arcuate arm 17, with the arm 17 being secured in place at any point by virtue of the provision of a locking bolt 83 as best shown in FIG. 5 of the drawings.

In use or operation of the improved layout apparatus, it will first be assumed that the component parts have been assembled to the position shown in full lines in FIG. 1 and that the rail 12 has been fixed or secured with respect to the table surface 14 by inserting shot pins 58 into the bushings 49,49 of two adjacent locating stations 13,13 in the manner shown in FIG. 6. At this time and assuming that it is desired to have adjustment of the direction of travel of the layout machine, it is merely necessary that the locking nut 83 be released and that one shot pin 58 be removed, with the other pin 58 serving as a pivot point as has been shown in FIG. 5 of the drawings. At this time it is possible to

move the rail to the chain-dotted line position of FIG. 1, for example, and when this has been achieved, it is merely necessary to re-tighten the locking member 83, at which time the rail will be fixed against further angular movement.

It will be seen from the foregoing how there has been produced a new and improved type of layout machine characterized by the presence of adjustment means that enable the machine to accurately lay out an unlimited number of angular planes.

It should be understood that bracket 16 can be used in either right or left hand fashion to further increase the number of available planes.

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 shown.

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

What is claimed is:

1. Layout apparatus of the character described, comprising;

A. a work surface table;

B. a plurality of aligned locating means on said table;

C. an elongate guide rail selectively engageable with at least one of said locating means in pivotal relationship therewith whereby said rail portion may be pivoted with respect to said table at a plurality of locations;

D. an arm support secured to another said locating means and having an opening therethrough;

E. an arcuate arm carried by said guide rail at a point spaced from the point of connection thereof with said locating means and being received in said opening of said arm support whereby said arm and said guide rail may pivot as a unit around the point of connection between said guide rail and said locating means, and

F. a layout machine having a base member adapted to move longitudinally on said guide rail in straight-line movement.

2. The apparatus of claim 1 further characterized by the presence of locking means adapted to selectively fix said elongate guide rail to said arm support.

3. The apparatus of claim 1 wherein said elongate guide rail contains at least one information imparting member.

4. The apparatus of claim 1 further characterized by the presence of first drive means carried by said base member and engaging said elongate guide rail.

5. The apparatus of claim 4 further characterized by the presence of second drive means carried by said base member whereby fine adjustment of the travel of said layout machine may be obtained.

6. The apparatus of claim 1 further characterized by the presence of indicia on said arcuate guide rail.

7. The apparatus of claim 1 further characterized by the presence of a pair of support arms projecting from said base member and engaging said elongate guide rail on opposed edges thereof.

8. The apparatus of claim 1 further characterized by the fact that said locating means are secured to and project from said table; said guide rail having a plurality of openings and means for engaging said projecting locating means with said openings.

9. The apparatus of claim 8 further characterized wherein said means for engaging are shot pins releasably interconnecting said opening in said elongate guide rail and said locating means.

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