

March 26, 1946.

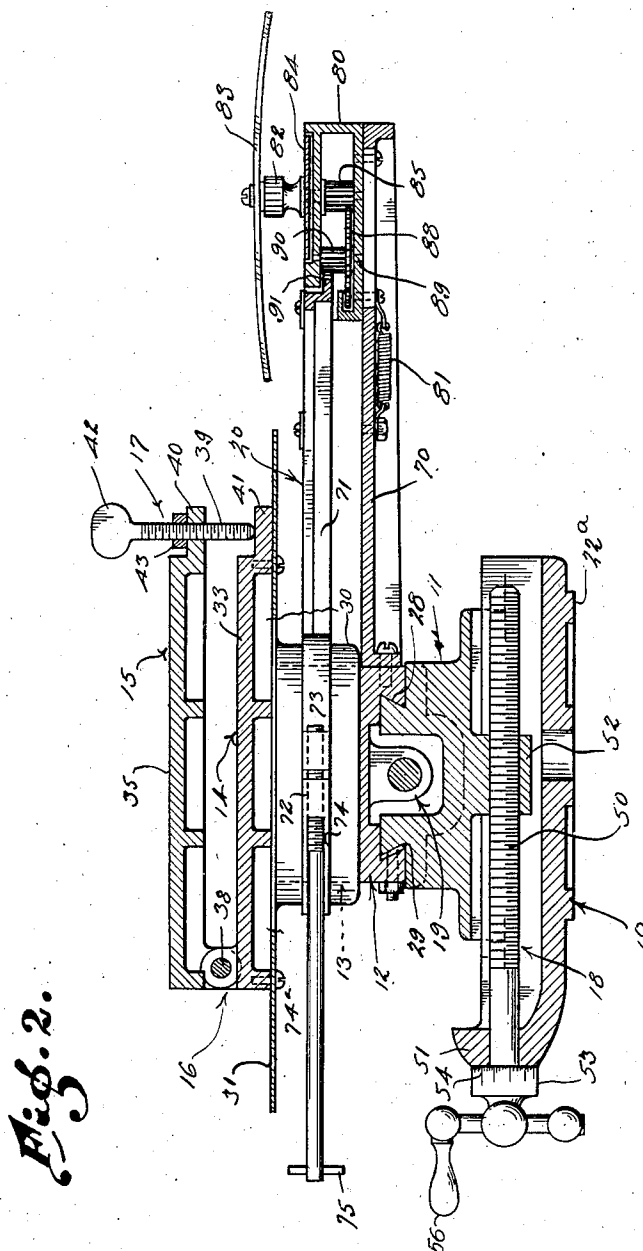
D. TILTON

2,397,300

WORK CARRIER

Filed March 17, 1944

3 Sheets-Sheet 2



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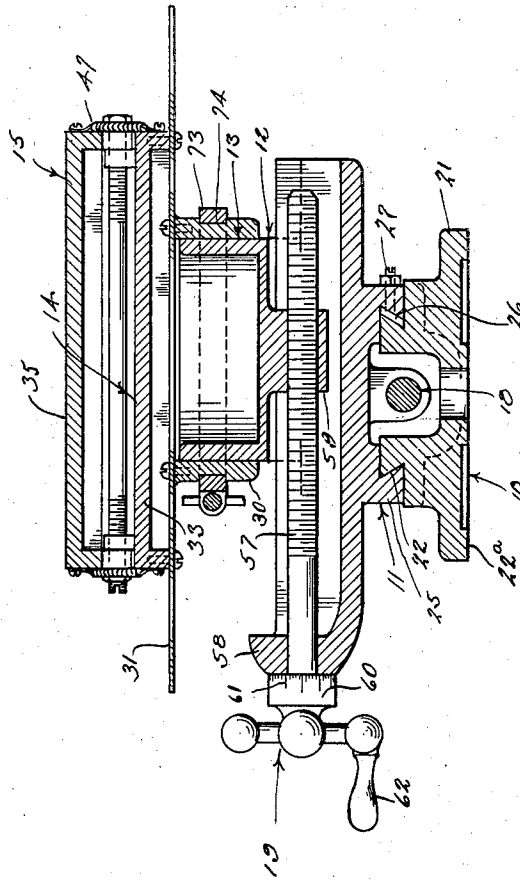
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WORK CARRIER

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7 Claims. (Cl. 51—216)

This invention has to do with a work carrier in the nature of an adjustable work supporting table and it is a general object of the invention to provide such a device involving various adjustments and which operates to effectively and firmly support an object to be worked upon.

There are numerous situations in which it is desired to mount or support an object such as a unit to be worked upon so that that object is held firmly in a certain position. For example, quartz crystals such as are used in various apparatus, must be cut from mother quartz and in order to do so the mother quartz is held while the cutting operation is performed and it is highly important that the mother quartz be held very accurately at exactly the proper angle. The invention is particularly useful in carrying out operations such as crystal cutting. However, it possesses features and characteristics making it desirable and useful generally in a wide variety of situations and, therefore, it is to be understood that although the device described may be referred to as a support for carrying various sizes and shapes of mother quartz formations, or the like, the invention is not to be understood as thereby limited to any specific use.

It is a general object of the present invention to provide a device or unit of apparatus such as I have referred to which operates to firmly and securely carry an object to be worked upon. The device of the present invention involves numerous features of adjustment and construction by which the parts are related for relative movement and yet are free of play that would otherwise result in errors as the device is used.

Another object of my invention is to provide a device of the general character referred to involving a series of adjustments whereby it is possible to accurately or delicately adjust an object held by the device to precisely the angle or position desired.

A further object of the present invention is to provide a device of the general character referred to in which the parts are shielded or protected against grit or abrasives that may be present during operation, with the result that the mechanism maintains its accuracy over a long period of time.

The various objects and features of my invention will be fully understood from the following detailed description of a typical preferred form and application of the invention, throughout which description reference is made to the accompanying drawings, in which:

Fig. 1 is a perspective of the mechanism of the present invention. Fig. 2 is a detailed transverse

sectional view of the mechanism being a view taken substantially as indicated by line 2—2 on Fig. 1, certain of the parts being shown in elevation. Fig. 3 is a detailed transverse sectional view taken substantially as indicated by line 3—3 on Fig. 1.

The device of the present invention involves, generally, a base 10, a carriage 11 mounted on the base for horizontal movement in a direction transverse of the base, a crosshead 12 mounted on the carriage for horizontal movement in a direction transverse of the carriage, a vertical spindle 13 projecting upwardly from the crosshead, a body 14 rotatably supported on the spindle, a work supporting plate 15, means 16 pivotally supporting the plate 15 on the body 14, means 17 for adjusting the plate 15 relative to the body 14, means 18 for operating the carriage relative to the base 10, means 19 for operating the crosshead relative to the carriage, and means 20 for releasably setting the body against rotation on the spindle and various other features of arrangement and construction, all of which will appear from the following description.

The base 10 is designed to be placed on or secured to a foundation or stationary part of a mechanism such as a cutting or grinding mechanism, and to that end has a mounting flange 21 having a flat bottom 22^a. The base 10 serves primarily as a support for the carriage 11 and serves to support the carriage so that it is movable or adjustable horizontally.

In the form of the invention illustrated the base 10 has a horizontally disposed guideway 22 which is on the upper side of the base or faces upwardly to guide and support the carriage 11. In practice the base 10 may be formed or fabricated in any suitable manner. However, it is most convenient to make it a casting, as such construction is rigid and lends itself to the formation of a guideway that will effectively support the carriage.

The carriage 11 rests on and is supported by the guideway 22 of the base 10. In the particular construction illustrated the guideway 22 of the base includes a pair of spaced rails the outer sides of which are undercut and the carriage 11 rests on the top of the rails and has depending parts 25 which engage in the undercuts so that the carriage is effectively retained on the base. To compensate for wear and to maintain the proper fit between the carriage and the base I provide a bearing shoe 26 on one of the depending parts 25 to bear on the outer side of one of the rails of

the base and I provide screws 27 for adjusting the shoe.

The carriage 11 is provided primarily as a support for the crosshead 12 and to carry out this function the carrier has a guideway 28 provided at its upper side, which guideway includes a pair of rails similar to those provided on the base to support the carriage. The guideway 28 of the carrier extends horizontally and is disposed so that it is at right angles to the guideway 22 of the base.

The cross head 12 rests on and is slidably carried by the guideway 28 of the carriage and is secured to the carriage by engaging the undercut rails and it has an adjustable shoe 29 for taking up wear and for maintaining proper fit between the crosshead and carriage.

The vertical spindle 13 projects upwardly from the crosshead and is preferably located so that its axis intersects that of the guideway. The spindle is provided to serve as an effective support for the body 14 and is preferably made short or limited as to its vertical dimension but as large as practical in diameter. This keeps the vertical height of the mechanism down and yet provides an effective stable bearing for the body 14.

The body 14, together with the plate 15, the mounting means 16 and the adjusting means 17, forms a head supported by the structure thus far described. The body 14 has a depending collar 30 finished to slidably receive the spindle 13. A flange 31 projects radially from the upper end of the collar 30 and overhangs the mechanism thus far described and serves to carry an indicating scale 32 and has a part to be gripped for the purpose of rotating the head for general adjustment. The upper section 33 of the body 14 is secured to the upper side of the flange 31 and serves to carry various parts as will be hereinafter described. In the preferred construction the flange 31 of the body is in the form of a round plate arranged concentric with the axis of the spindle 13.

The work supporting or carrying plate 15 is arranged immediately above the top or upper section 33 of the body. The plate 15 is preferably provided with a flat suitably finished top face 35 to which work may be applied. I have shown the plate 15 as a plain flat plate, whereas it will be understood that the plate can be provided with holes or work holding devices, as circumstances may require.

The means 16 pivotally connecting the plate 15 with the body 14 includes hinge parts 36 and 37 on the plate 15 and body 14, respectively, and a pivot pin 38 connecting the hinge parts. In the preferred arrangement the pivotal connection is rotated adjacent one edge of the plate 35 and the axis of the connection is horizontally disposed, as is shown throughout the drawings. The means 17 for adjusting the plate 15 is preferably located at the opposite edge of the plate 15 and may, as I have shown in the drawings, include an adjusting screw 39 threaded through a lug 40 on the plate 15 to project downwardly so its lower end bears on a bead 41 provided on the upper section 33. The screw 39 as shown in the drawings is a thumb screw having an operating head 42 and is adapted to be set in the desired adjusted position by a lock nut 43.

In accordance with the preferred form of the invention means is provided for indicating the angular position of the plate 15 about the pivotal means 16. This may include a scale 45 carried by one of the parts, say for instance, the body, to

cooperate with an indicator 46 carried by the other part.

It is also preferred to provide means for maintaining the plate 15 tight relative to the body 14 to eliminate vibration or movement. In the form of the invention illustrated I provide a tension spring 47 acting under tension between the plate 15 and the top section 33 of the body to normally urge or swing the plate 15 downwardly and thereby hold the adjusting screw 39 tight on the pad 41. It will be understood, of course, that there may be a spring 47 at each side of the table as is indicated in Fig. 3.

The means 18 provided by the present invention for operating the carriage relative to the base is preferably a screw means. This means, as is best shown in Fig. 2 of the drawings, includes an adjusting screw 50 rotatably supported by a bearing part 51 of the base 10 and threaded through a lug 52 depending from the carriage between the rails of the guideway 22 of the base. A collar 53 is provided on the outer end of the screw adjacent the bearing 51 and carries a scale 54 to cooperate with a reference mark 55 on the bearing 51 to indicate the rotative position of the screw. An operating handle 56 is provided outward of the collar 53 so that the screw can be conveniently rotated.

The means 19 provided for operating the crosshead relative to the carriage is preferably a screw means. As shown in the drawings and as best seen in Fig. 3 the means 19 includes, generally, an operating screw 57 rotatably carried by a bearing part 58 on the carriage. The screw is threaded through a lug 59 depending from the crosshead between the rails of the guideway 28. A collar 60 is provided on the outer end of the screw beyond the bearing 58 and has graduations 61 cooperating with a reference mark on the bearing 58 to indicate the rotative position of the screw. A suitable operating handle 62 is provided immediately beyond the collar 60.

The means 20 provided for releasably setting the head against rotation includes, generally, an arm 70 projecting laterally from the crosshead and fixed to the crosshead so that it can be considered a stationary arm, an arm 71 projecting from the body 14 and connected to the body through a clamp device, and a suitable mechanism connecting the outer end portions of the arms 70 and 71 as will be hereinafter described.

The arm 70 projects horizontally and laterally from the crosshead to a point somewhat beyond the outer end of the arm 71 and both arms project outwardly beyond the rim or perimeter of the flange 31. The arm 71 is carried by the body 14 but is releasably connected thereto so that the body is free to rotate relative to the arm. In the construction illustrated the arm 71 projects from a split ring 73 which is rotatably supported in a channel 74 in the exterior of the collar 30. The clamp device 72 occurs at the point where the ring 73 is split and it includes lugs on the ring and a clamp screw 74^a cooperating with the lugs so that the screw can be rotated to clamp the ring tight on the collar 30 or to release the ring from the collar allowing the body 14 to turn freely relative to the arm 71. The screw 74 projects beyond the outer edge of the flange 31 where it is provided with an operating handle 75 making it convenient to operate.

The mechanism provided by the present invention for connecting the arms 70 and 71 is designed to normally hold the arms against movement but is operable to provide a very fine or

delicate adjustment between the arms when it is desired to accurately adjust the rotative position of the body.

In accordance with the broader principles of the present invention various means may be provided for connecting the arms 70 and 71. However, in the preferred construction this means includes a case 80 slidably supported on the outer end portion of the arm 70 to be shiftable radially relative to the arm. A tension spring 81 is connected between the arms 70 and the case 80 as will be seen in Fig. 2 so that it normally urges the case inwardly toward the center of the mechanism. A vertical spindle 82 is carried by the case to extend through the case and to project above it to carry a disc 83 which acts as a shield for the mechanism. The disc is preferably formed of transparent material. An indicating dial 84 is carried by the spindle 82 at the top of the case 80 to be visible through the disc 83. The dial 84 has graduations 87 which cooperate with a reference mark 86 on the case to show the rotative position of the spindle.

A pinion 85 is fixed on the spindle 82 within the case 80 and meshes with a gear 88 carried on a spindle 89 mounted in the case. The spindle 89 also carries a pinion 90 which meshes with a gear segment 91 fixed on the outer end of the arm 71 and formed concentric with the spindle 13. Through this mechanism the arms 70 and 71 are normally secured together against relative movement. However, a very fine or accurate adjustment of the arm 71 relative to the arm 70 can be obtained by rotating the disc 83. It will be apparent that the gear train just described forms a very effective and delicate adjusting means. It will also be apparent that the spring 81 normally serves to hold the gear train tight, keeping lost motion out of the mechanism. In practice I provide a reference mark 95 on the arm 71 to cooperate with the graduations 87 on the flange 31 in order to show the rotative position of the head.

From the foregoing description it is believed that the general action or mode of operation of the mechanism will be fully understood. It will be apparent that the directions of adjustment between the base and the carriage and the carriage and the crosshead, being horizontally disposed and being at right angles to each other, enable the means 18 and 19 to be operated to adjust the crosshead in any desired horizontal direction. The desired general rotative position of the work can be gained by releasing the screw 74^a and moving the head including the body 14 and plate 15 through engagement of the flange 31. For fine or delicate rotative adjustment the disc 83 is employed while the screw 74^a is set. To tilt or tip the work about a horizontal axis the screw 17 is operated to move the plate 15 about the pivotal mounting 16.

Having described only a typical preferred form and application of my invention I do not wish to be limited or restricted to the specific details herein set forth, but wish to reserve to myself

any variations or modifications that may appear to those skilled in the art or fall within the scope of the following claims.

Having described my invention, I claim:

1. In combination a work carrying head, a mounting supporting the head for rotation about a vertical axis, an arm projecting from the mounting, a second arm, means releasably connecting the second arm to the head, and means connecting the arms together.
2. In combination a work carrying head, a mounting supporting the head for rotation about a vertical axis, an arm projecting from the mounting, a second arm, a screw operated clamp releasably connecting the second arm to the head, and means connecting the arms together.
3. In combination a work carrying head, a mounting supporting the head for rotation about a vertical axis, an arm projecting from the mounting, a second arm, means releasably connecting the second arm to the head, and means connecting the arms together including a gear train.
4. In combination a work carrying head, a mounting supporting the head for rotation about a vertical axis, an arm projecting from the mounting, a second arm, means releasably connecting the second arm to the head, and means connecting the arms together including a gear segment on one arm, a gear carried by the other arm and meshing with the segment, and operating means for the gear.
5. In combination a work carrying head, a mounting supporting the head for rotation about a vertical axis, an arm projecting from the mounting, a second arm, means releasably connecting the second arm to the head, and means connecting the arms together including a gear segment on one arm, a gear carried by the other arm and meshing with the segment, and operating means for the gear including an indicating dial.
6. In combination a work carrying head, a mounting supporting the head for rotation about a vertical axis, an arm projecting from the mounting, a second arm, means releasably connecting the second arm to the head, and means connecting the arms together including a gear segment on one arm, a case shiftable carried by the other arm, a manually operable gear carried by the case meshing with the segment, and a spring normally yieldingly urging the case so the gear is kept in tight engagement with the segment.
7. In combination a work carrying head, a mounting supporting the head for rotation about a vertical axis, an arm projecting from the mounting, a second arm, means releasably connecting the second arm to the head, and means connecting the arms together including a gear segment on one arm, a gear carried by the other arm and meshing with the segment, and operating means for the gear including a transparent disc forming a shield for the gear and segment.

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