Dec. 13, 1960 W. MUENCH 2,963,946

ANGULARLY ADJUSTABLE WORK SUPPORTING DEVICE

Filed Jan. 25, 1957 4 Sheets-Sheet 1

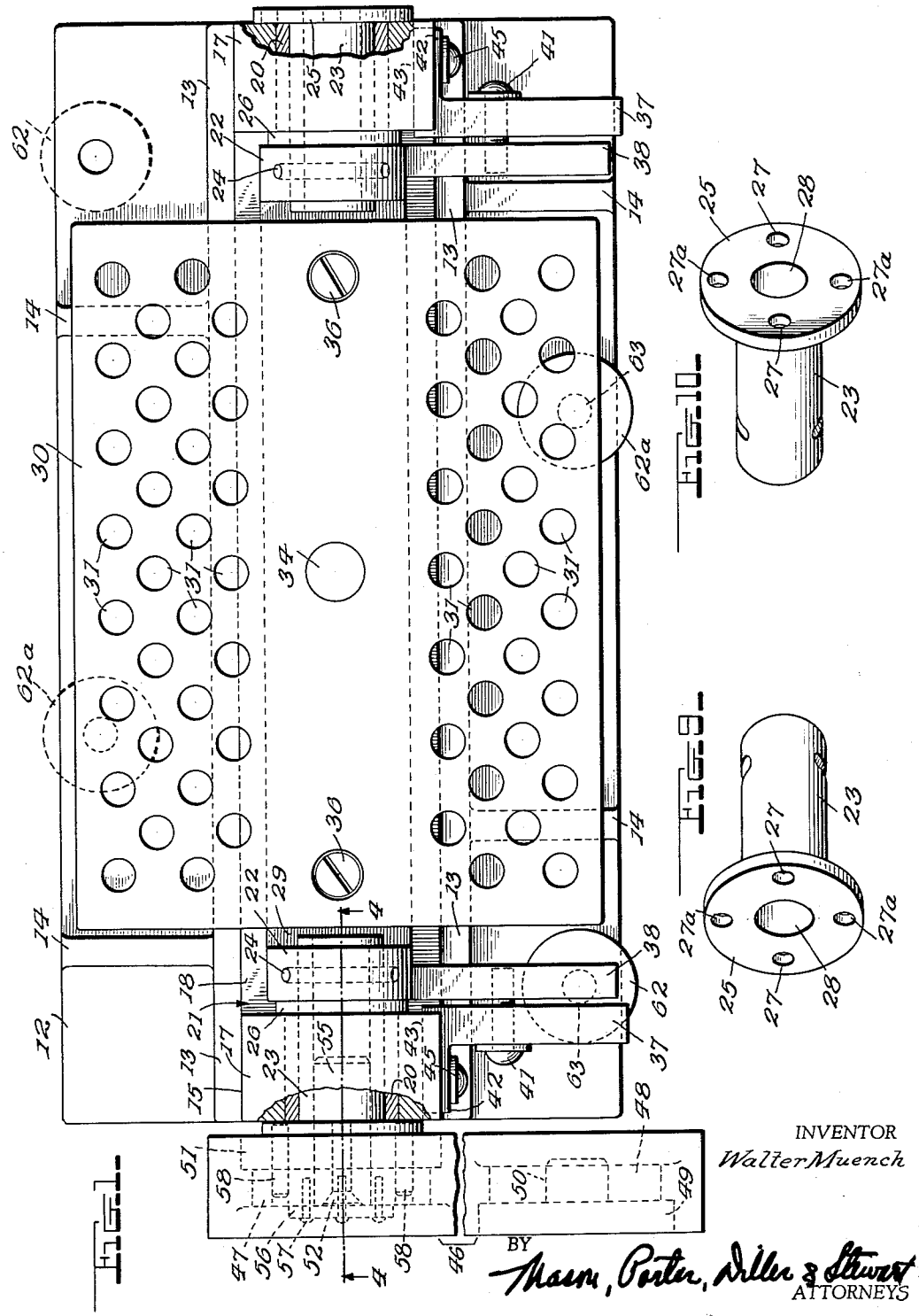


Fig. 1

Fig. 10

Fig. 9

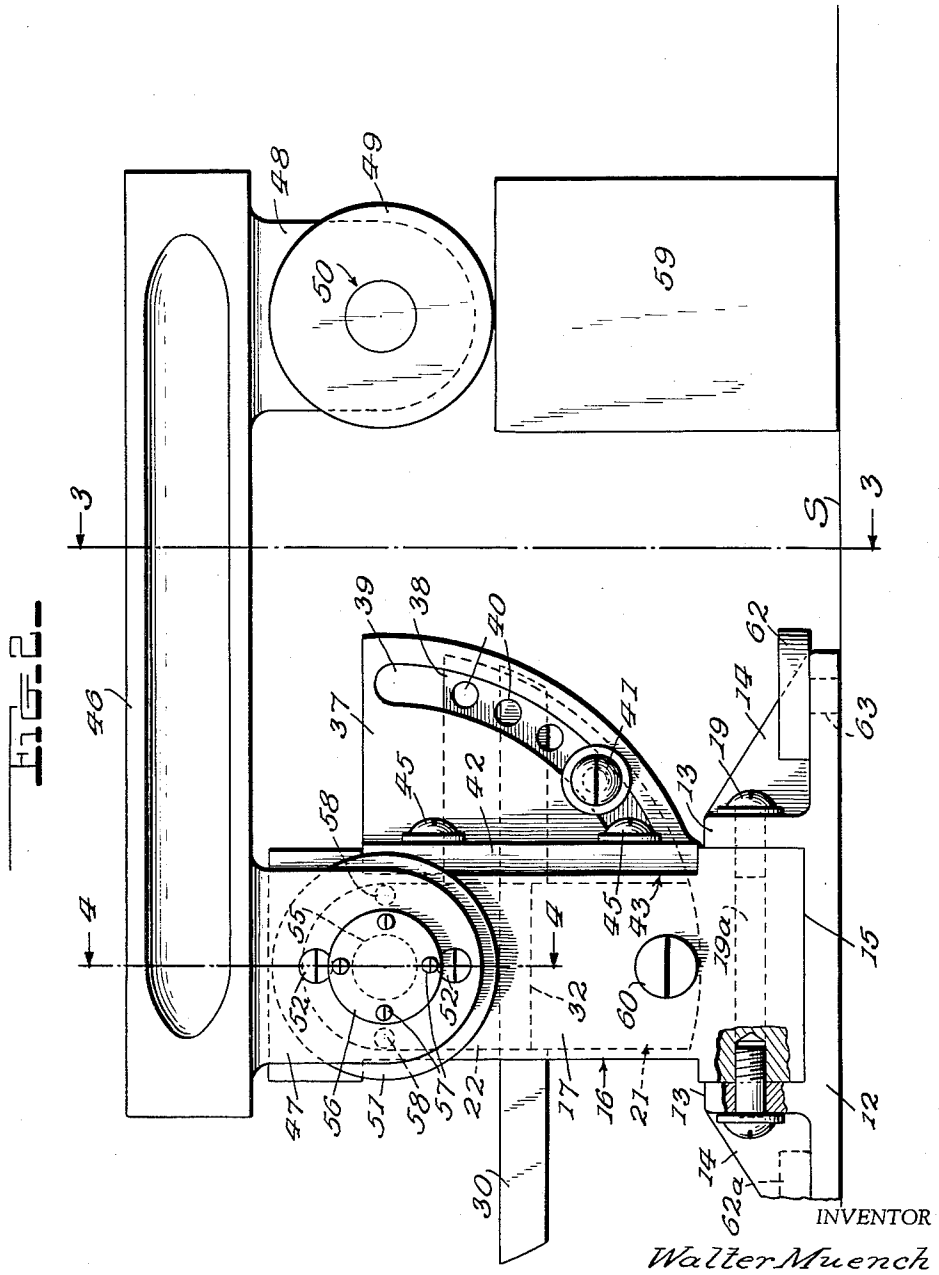
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ANGULARLY ADJUSTABLE WORK SUPPORTING DEVICE

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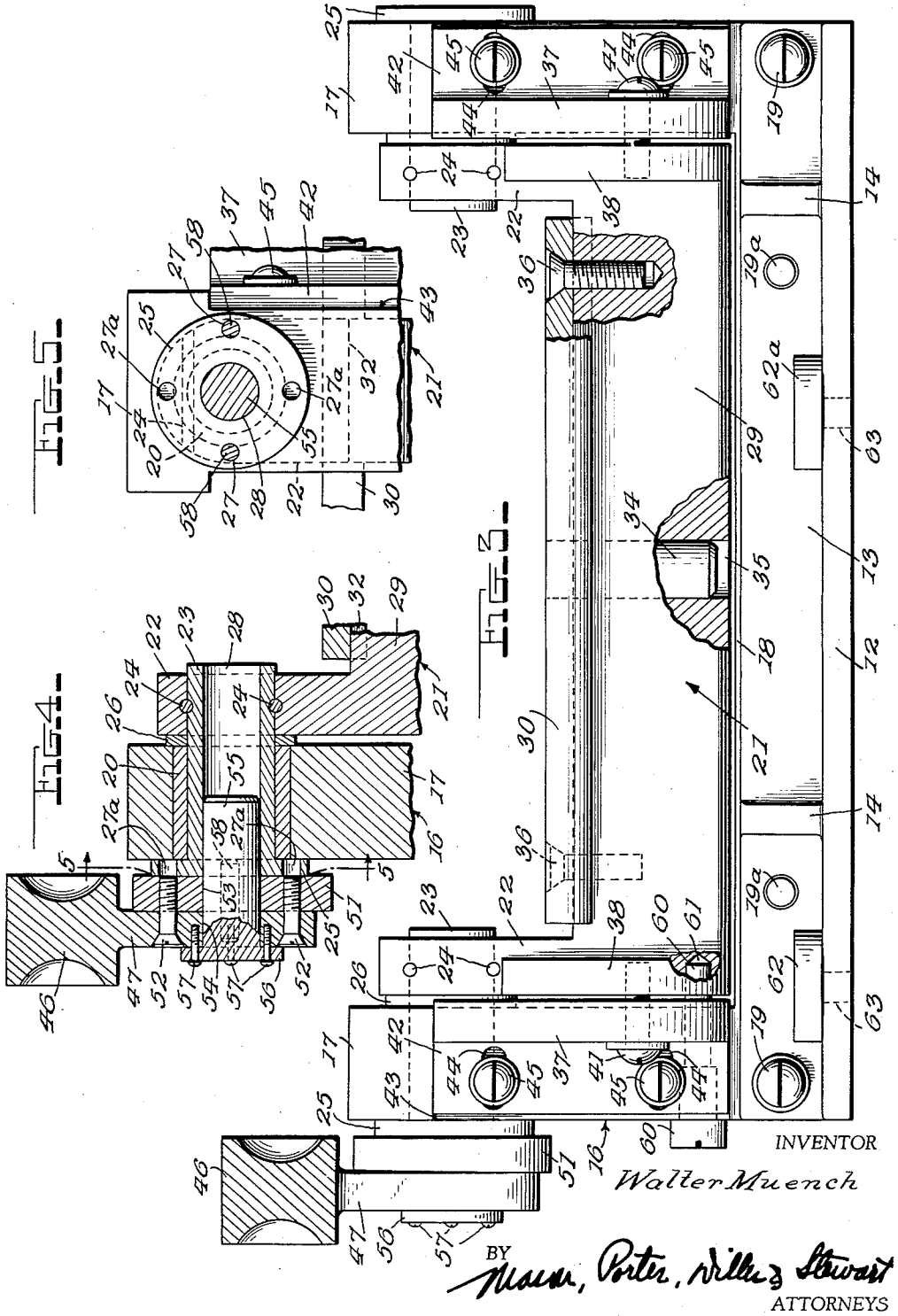
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ANGULARLY ADJUSTABLE WORK SUPPORTING DEVICE

Filed Jan. 25, 1957 4 Sheets-Sheet 3



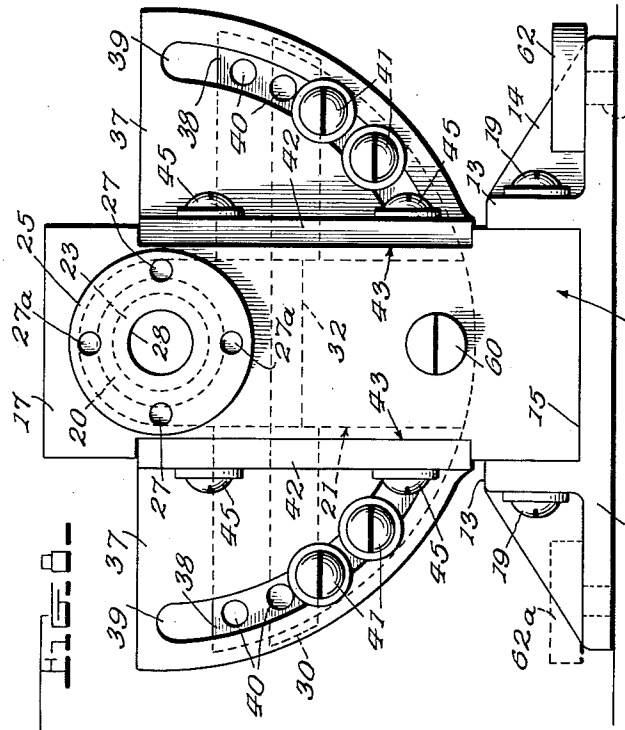
INVENTOR
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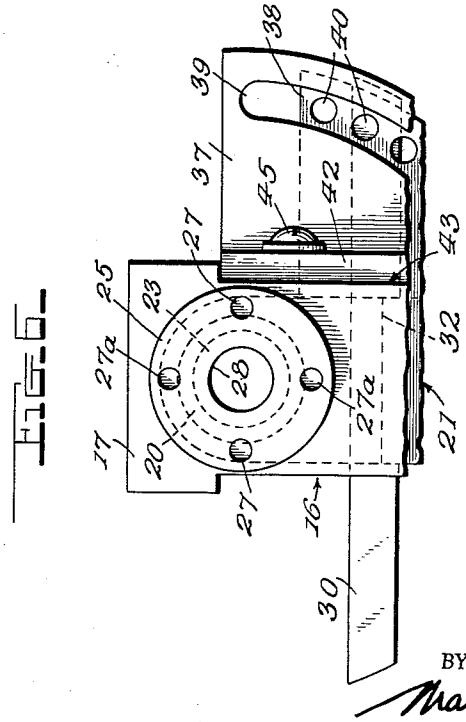
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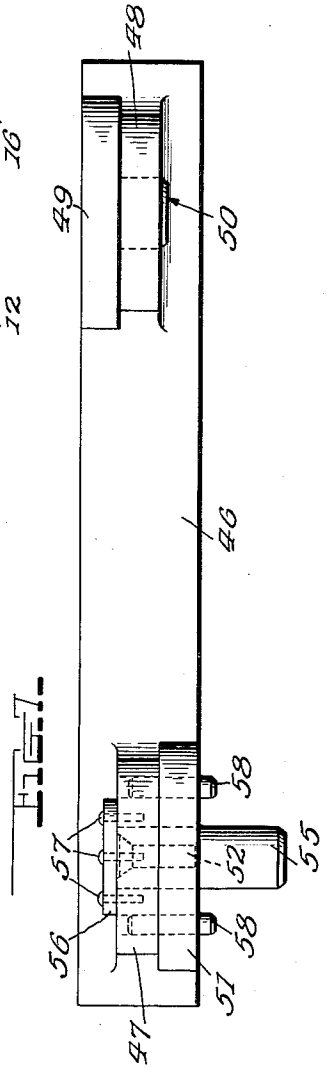
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ANGULARLY ADJUSTABLE WORK SUPPORTING DEVICE

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ANGULARLY ADJUSTABLE WORK SUPPORTING DEVICE

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4 Claims. (Cl. 90—59)

This invention relates to a novel angularly adjustable device for supporting a work piece upon a machine while performing an angular drilling, milling, grinding or other operation upon said work piece.

More specifically, the invention relates to such a work supporting device having a U-shaped support frame and a U-shaped swing frame, the upstanding arms of said swing frame being pivoted to the corresponding arms of said support frame. The arm-connecting portion of the U-shaped support frame is mounted on a base, a work mounting plate is secured upon the arm-connecting portion of the swing frame, and means are provided for securing said swing frame to said support frame after setting of said swing frame in any desired angular position.

The principal object of the invention has been to provide a novel construction in which the support frame is detachably connected with the base, and in which the work mounting plate is detachably mounted on the swing frame. Thus, by detaching the base and the work mounting plate, the assembly of support frame and swing frame is readily useable as an assembly upon which to mount a diamond-point or other tool for use in the radius dressing of grinding wheels. Quite a saving in shop equipment may be thus effected as it is not necessary to have both a complete angularly adjustable work support and a complete radius dresser.

In attaining the above stated object, another object has been to provide a base of novel construction to rigidly yet detachably mount the support frame upon a machine which is to be used for performing an operation on a work piece secured to the work mounting plate.

A further object has been to provide a novel work mounting plate for rigid yet detachable connection with the swing frame.

A still further object has been to provide adjacent upstanding arms of the support frame and the swing frame with coacting lateral wings, to provide threaded fastening means for clamping said wings tightly together to lock the swing frame after adjustment thereof, and to make provision whereby at least the wing or wings of the support frame may be detached when the assembly of support frame and swing frame is to be employed for radius dressing.

Another object has been to make novel provision for detachably connecting a sine bar or the like with one of the pivot trunnions of the swing frame, for coaction with a Jo-block in setting said swing frame at a desired angle with respect to the support frame.

Still another object has been to provide the base with sine disks for use in setting said base in different angular positions.

Yet another object has been to provide a simple and inexpensive yet a durable and effective construction.

With the above and other objects in view that will hereinafter appear, the nature of the invention will be more clearly understood by reference to the following detailed description, the appended claims and the several views illustrated in the accompanying drawings.

In the drawings:

Figure 1 of the accompanying drawings is a top plan view partly broken away and in section.

Figure 2 is a left end elevation, partly broken away.

Figure 3 is a front elevation partly broken away and in section, substantially on line 3—3 of Figure 2.

Figure 4 is a fragmentary vertical longitudinal sectional view on line 4—4 of Figures 1 and 2.

Figure 5 is a vertical transverse sectional view on line 5—5 of Figure 4.

Figure 6 is a fragmentary end elevation, similar to a portion of Figure 2, but with the sine bar detached.

Figure 7 is a bottom view of the detached sine bar.

Figure 8 is an end elevation showing a modified construction in which additional wings and coacting fasteners are employed.

Figures 9 and 10 are perspective views of the two trunnions of the swing frame.

A preferred construction has been illustrated in the drawings and will be rather specifically described but attention is invited to the possibility of making variations.

A flat base plate 12 is provided, said base plate being formed with parallel longitudinal upwardly projecting flanges 13 and with bracing webs 14 for said flanges. The flanges 13 are equidistantly spaced from the longitudinal center of the base plate 12, and the space between said flanges constitutes an upwardly open channel 15.

A U-shaped support frame 16 is provided. The upstanding arms of this support frame are shown at 17 and the arm-connecting portion at 18. This arm-connecting portion is of elongated form and is shaped and dimensioned for snug seating in the base plate channel 15, in which it is rigidly secured by screws 19 and dowel pins 19*a*. The upper ends of the arms 17 are provided with aligned self-lubricating bearings 20.

A U-shaped swing frame 21 is provided within the confines of the support frame 16. The upstanding arms 22 of this swing frame 21 are provided with pivot trunnions 23 pinned thereto at 24, said trunnions extending through the bearings 20 of the support frame arms 17 and having annular flanges 25 abutting the outer sides of these arms. Each trunnion carries a self-lubricating thrust washer 26 between the arms 17 and 22. Each flange 25 is formed with two openings 27 disposed on one diametrical line, and with two additional openings 27*a* on another diametrical line at 90° to said one line, all of the openings being of the same diameter and being equidistant from the trunnion axis. Each trunnion 23 has a longitudinal bore 28.

The arm-connecting portion 29 of the swing frame 21 is elongated and disposed longitudinally over the corresponding portion 18 of the support frame 16. A work mounting plate 30 is secured upon the arm-connecting portion 29 and is formed with a plurality of bolt or screw holes 31 to facilitate the clamping of a work piece thereon. The plate 30 is formed with a downwardly open channel 32 in which the arm-connecting portion 29 is snugly seated, and said plate has a downwardly projecting centering stud 34 received in an opening 35 in said portion 29. Screws 36 detachably secure the plate 30 to this portion 29.

Coacting lateral wings 37 and 38 are provided on the ends of the support frame 16 and the swing frame 21, respectively. These wings may be at the front only of the device, as in most views or at both front and rear as in Figure 8. Each wing 37 has a slot 39 concentric with the axis of the trunnion 23, and each wing 38 has spaced screw holes 40 exposed through said slot, permitting the use of one or more screws 41 to clamp each set of coacting wings together, for the purpose of locking the swing frame 21 to the support frame 16 after swinging said

swing frame 21 into desired angular relation with said support frame 16.

Each wing 37 is formed with an attaching flange 42 at its inner end and slidably seated in a guideway 43 in the adjacent arm 17, for movement into and from contact with the coacting wing 38. Each flange 42 has slots 44 through which screws 45 extend for securing the wing 37 to the support frame 16 in operative contact with the coacting wing 38 of the swing frame 21 and for permitting shifting of said wing 37 from contact with said wing 38.

A sine bar 46 is provided for connection with either trunnion 23 for use in setting the swing frame 21 and plate 30 in any desired angular relation with respect to the support frame 16 and base plate 12. This sine bar has two downwardly projecting lugs 47 and 48 at its ends, respectively, and a sine disk 49 is attached at 50 to the lug 48. A circular plate 51 is attached by screws 52 to one side of the lug 47 as best seen in Figure 4. This plate and lug have aligned openings 53, 54, and a supporting pin 55 extends through said openings and projects beyond the plate 51 for snug reception in the bore 28 of either of the trunnions 23, said pin 55 having a flange 56 secured by screws 57 to the lug 47. This lug and the plate 51 also carry two dowel pins 58 disposed on a diametrical line through the supporting pin 55. The dowel pins 58 project beyond the plate 51 and are located for reception in the openings 27 or 27*a* of either trunnion 23 when the supporting pin 55 is received in the trunnion bore 28. When angular adjustment of the swing frame 21 is to be made with the base plate 12 mounted in horizontal position and the work mounting plate 30 also horizontal, the dowel pins 58 are inserted into the openings 27 as seen in Figure 5. However, when such angular adjustment is to be done with the two plates 12 and 30 in vertical positions, the dowel pins 58 are inserted into the openings 27*a*. In either case the sine bar 46 may be horizontally positioned as seen in Figure 2. Then, a Jo-block 59 may be placed under the sine disk 49 and any required additional Jo-block may be inserted between said block 59 and said sine disk 49 to set the swing frame 21 in the desired angular position, in which position it is locked by tightening of the screws 41 and 45, the sine bar 46 being then removed.

It is preferable to provide a screw 60 (Figure 3) for locking the swing frame 21 against loose idle movement with respect to the support frame 16 while mounting the base plate 12 in any required upright or inclined position. The screw 60 extends through the arm 17 at one end of the support frame 16 and is receivable in a socket 61 in the adjacent end of the swing frame 21. A duplicate screw, for the same purpose, may well be provided at the other end of the frames 16 and 21.

To aid in setting the device when the base plate 12 must be mounted in different angular positions, sine disks 62 and 62*a* are detachably mounted at 63 upon said base plate.

While the sine bar 46 and the sine disks 49 and 62 are preferably employed to aid in accurately setting the device to mount a work piece in required position, simple settings may of course be accomplished with a protractor.

When the device is to be made ready for an angular setting, the base plate 12 may be placed on a horizontal support S as seen in Figure 2, with the screws 41 and 45 in slightly loosened condition, and the measured Jo-block 59 is placed under the sine disk 49, thus initially setting the swing frame 21 in a vertical zero position. Now, assuming that the sine bar 46 is a five inch bar and that it is desired to tilt the swing frame 21 to an angular position of 14 degrees and 29 minutes, for which the sine is .25010 per inch, another Jo-block 1.2505" high must be inserted between the Jo-block 59 and the sine disk 49. The screws 41 and 45 are then tightened and the sine bar 46 is removed, leaving the device set at the desired height angle.

We will now assume that the device is to be set at any required surface angle, say ten degrees, to the ways of a machine table. This may be done accurately with the aid of the same sine bar 46 as the base plate 12 is precision machined with right-angular corners and flat surfaces.

We have now considered two angular settings (a height angle and a surface angle) but any device of this general character should be capable of setting at any required side angle (from left to right or vice versa). Such a setting is made possible by fastening the base plate 12 to the upright column of a 90° angle plate at the desired angle.

Any two or all three of the above explained angular settings may be compounded. When compounding settings involving securing of the base plate 12 to the vertical column of an angle plate, the operation is facilitated by the sine disks 62 and 62*a*. In this connection, it should be observed, in Figures 1 and 2, that the disk 62 is close to the left end of the base plate 12, to clear the left corner edge of the device in as low a position as possible when the right end carrying the disk 62*a* is swung up for a degree setting when fastened to the aforesaid angle plate.

The two sine disks 62 and 62*a* are shown in full lines on the front portion of the base plate 12 but they are attachable in the same relation to the rear portion whenever required, as shown in dotted lines in Figures 1, 2 and 8.

By removing the base plate 12 and wings 37 from the support frame 16, removing the plate 30 from the swing frame 21 and, of course, removing the sine bar 46, the assembly of support frame and swing frame may readily be employed as elements of a radius dresser, the diamond-point or other dressing tool being then appropriately mounted on said swing frame.

Whenever it should be desired to use the sine bar 46 in a position in which the pins 55 and 58 would interfere, pin 55 may be entirely removed and the pins 58 may be forced back to retracted positions.

From the foregoing, it will be seen that novel and advantageous construction has been disclosed for attaining the desired ends. However, attention is again invited to the possibility of making variations within the scope of the invention.

I claim:

1. A work support comprising a base plate, a rectilinear generally U-shaped support frame seated on said base plate, a rectilinear generally U-shaped swing frame within the confines of said support frame, said support frame including flat upstanding arms and a rectangular cross-sectional arm-connecting portion, means fixedly and removably securing said support frame to said base plate, said swing frame including flat upstanding arms and a relatively deep generally rectangular cross-sectional arm-connecting portion, said swing frame arms being parallel to said support frame arms, and axially aligned pivot means pivotally connecting adjacent ones of said arms together to allow angular adjustment of said swing frame with respect to said support frame, a flat work mounting plate seated on said swing frame arm-connecting portion and extending transversely therebeyond, means fixedly and removably securing said work mounting plate to said swing frame, said work mounting plate extending substantially between said swing frame arms and having an upper surface disposed adjacent the axes of said pivot means, and releasable means for securing said swing frame to said support frame after angular adjustment of said swing frame with respect to said support frame, said pivot means including bearings carried by said arms of said support frame and trunnions received in said bearings, said trunnions being secured to said arms of said swing frame, at least one of said trunnions extending entirely through the adjacent arm of the support frame, this trunnion having a central bore and sockets spaced around said bore, said bore and sockets being open at the outer end of the trun-

nion to receive projecting elements of a sine bar, permitting use of the latter in angularly setting said swing frame.

2. In a holder for machine tools wherein the holder includes a frame member, a support member, a sine bar for accurately positioning said support member relative to said frame member, and connecting means removably connecting said sine bar to said support member for movement therewith and connecting said support member and sine bar to said frame member for swinging movement relative thereto; the improvement residing in said connecting means which comprises a tubular trunnion fixedly secured to said support member and rotatably journaled in said frame member, said trunnion extending entirely through said frame member, said trunnion having a central bore and at least one radially offset socket, a sine bar supporting pin secured to said sine bar and projecting into said trunnion bore, and a sine bar positioning pin projecting into said socket.

3. The connecting means of claim 2 wherein said trunnion has an end flange abutting said frame member remote from said support member to limit movement of said support member relative to said frame member axially of said trunnion, and said socket is formed in said end flange.

4. In a holder for machine tools wherein the holder includes a supporting frame and a swing frame pivotally mounted within said supporting frame, said supporting frame having a pair of spaced upstanding arms and said swing frame having a pair of upstanding arms, trunnions on said swing frame arms received in said supporting frame arms, and connecting means on said swing frame arms for securing said swing frame in an adjusted angular position relative to said supporting frame; the improvement residing in said connecting means which comprise a pair of brackets secured to opposite sides of each of said supporting frame arms, each of said brackets including a mounting flange slidably seated in and secured to a respective one of said supporting frame arms and a segmental wing flange disposed parallel to the general plane of said one supporting frame arm, an arcuate slot through each wing flange with the axis of said trunnions as a center, a segmental wing on a side of each of said swing frame arms in opposed relation to said wing flanges, and a plurality of headed clamping fasteners carried by each of said wings and extending through the slot of a respective one of said wing flanges.

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