

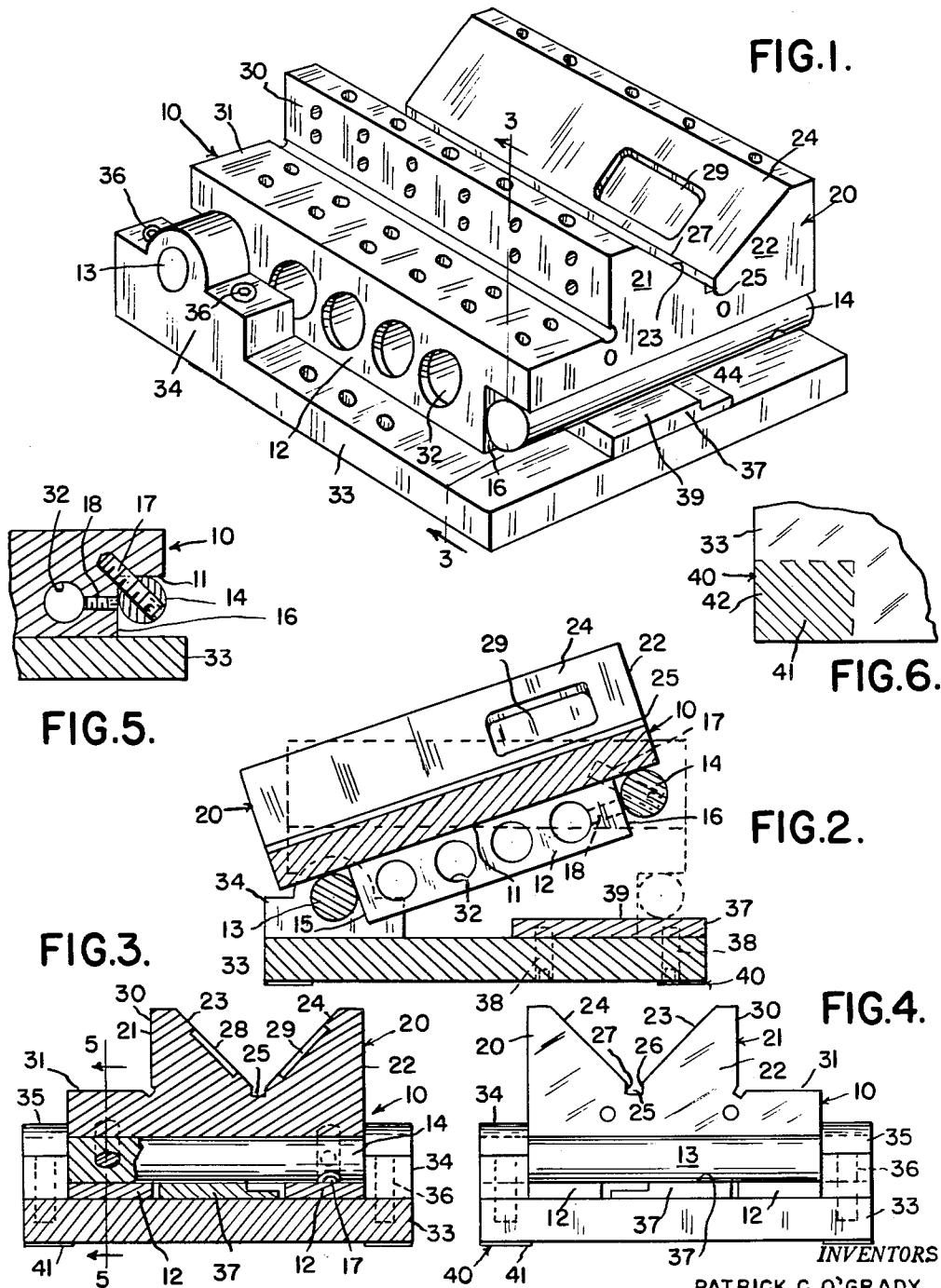
July 31, 1956

P. C. O'GRADY ET AL

2,756,508

COMBINATION SINE-BAR AND V-BLOCK

Filed Feb. 23, 1954



PATRICK C. O'GRADY
BY CHARLES H. O'GRADY

Whitmore, Hulbert & Bellis
ATTORNEYS

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COMBINATION SINE-BAR AND V-BLOCK

Patrick C. O'Grady and Charles H. O'Grady,
Mount Clemens, Mich.

Application February 23, 1954, Serial No. 411,693

4 Claims. (Cl. 33—174)

This invention relates to a combination sine-bar and V-block for accurately locating a work piece and measuring an angle thereof.

One object of this invention is to provide a sine-bar having a V-block formed integrally therewith.

Another object of the invention is to provide a sine-bar having the usual plugs which are mounted on the sine-bar in a manner which permits finely adjusting the spacing between the plugs to precisely the distance desired.

Still another object of the invention is to provide a combination sine-bar and V-block which is pivotally mounted upon a base plate. In particular, one of the sine-bar plugs is hinged to the base plate for vertical swinging movement of the sine-bar relative to the base plate.

A still further object of the invention is to provide a combination sine-bar and V-block having a stepped gaging block supporting member to increase the range of tapers that may be checked.

Other objects of the invention will become apparent as the following description proceeds, especially when taken in conjunction with the accompanying drawing wherein:

Figure 1 is a perspective view of a combination sine-bar and V-block constructed in accordance with the present invention;

Figure 2 is a longitudinal sectional view of the combination sine-bar and V-block shown in Figure 1, with the parts shown in two positions;

Figure 3 is a sectional view taken along the line 3—3 on Figure 1;

Figure 4 is a rear elevational view;

Figure 5 is a sectional view taken along the line 5—5 on Figure 3; and

Figure 6 is a detail view showing one of the rest pads for the base plate.

Referring now more particularly to the drawing, the sine-bar is generally indicated at 10 and is desirably formed of a high grade tool steel. The sine-bar 10 has a bottom plane surface 11 and is formed at opposite sides thereof with integral depending leg portions 12. The sine-bar is provided with the usual hardened and ground cylindrical plugs 13 and 14 which are of exactly the same diameter.

As shown particularly in Figure 2 of the drawing, the bottom surface 11 of the sine-bar, at opposite ends of the latter, provides an upper abutment for the plugs 13 and 14. In addition, it will be seen that the rear end surfaces 15 of depending legs 12 lie in a common plane which extends at right angles to the bottom surface 11 of the sine-bar. The front end surfaces 16 of the legs 12 likewise lie in a common plane which extends at right angles to the bottom surface 11 of the sine-bar, the plane of the front ends 16 of the legs 12 being parallel to the plane of the rear ends 15. Moreover, it will be noted that the front and rear ends of the leg portions terminate short of the front and rear ends of the sine-bar to define right angle recesses with

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the bottom surface 13 for the reception of the plugs (see Figure 2).

The plugs are respectively mounted in the recesses by means of suitable screws 17. The plugs are suitably transversely bored for the reception of these screws which thread into tapped bores in the sine-bar as best shown in Figure 5. In accordance with the above arrangement, it will be appreciated that the plugs are mounted on the sine-bar in accurate parallel relation and with their centers or axes lying in a plane parallel to the bottom surface 13 of the sine-bar.

In the design of a sine-bar, it is preferable that the distance between the centers of the plugs be an even dimension to facilitate calculations. However, in the manufacture of the sine-bar, it sometimes develops that the distance between the opposite end surfaces 15 and 16 of the leg portions is slightly undersize. Accordingly, the legs are longitudinally bored at their front ends, as indicated in Figures 2 and 5, for the reception of suitable headed adjusting elements 18, these elements having shanks which threadedly engage in the longitudinal bores in the legs.

If it is found that the distance between opposite ends of the legs is slightly undersize, then the adjusting elements may be backed off slightly to cause the heads to project beyond the front ends 16 of the legs to accurately determine the distance between the centers of the plugs. The pitch of the threaded shanks of these adjusting elements is such that a very fine adjustment can be made.

It will be understood that the bores in the sine-bar for the reception of the mounting screws 17 will not be formed until after any adjustment in the adjusting elements has been made.

The V-block is formed integrally with the sine-bar 10. V-block 20 comprises the laterally spaced upwardly and longitudinally extending portions 21 and 22 which have their inner sides 23 and 24 tapered to V configuration. The V formed by the sides 23 and 24 has an apex which extends parallel to the plane through the axes or centers of the plugs. It will be noted, of course, that the inner ends of these sides 23 and 24 do not actually meet since the apex of the V is obliterated by the longitudinally extending channel 25. However, the inner ends 26 and 27 of these sides run parallel to the apex of the V.

It will also be appreciated that the apex of the V lies in a plane perpendicular to the plug centers.

The V-block is provided for receiving a tool, for example, which has a taper to be measured. The tool is merely placed in the V of the V-block for this purpose. It will be noted that recesses 28 and 29 are formed in the tapering sides 23 and 24 of the V-block, being located in opposed facing relation to each other, and these recesses are provided to receive enlarged portions of the tool which are not being measured, so as to permit the tapering portion of the tool to rest snugly in the V.

The outer surface 30 of the V-block portion 21 is a plane surface extending at right angles to the plug centers, and the plane surface 31 is disposed parallel to the plane passing through the plug centers. Obviously, a tool having a taper to be measured could be supported in abutting relation to the surfaces 30 and 31.

The leg portions 12 of the sine-bar may be bored to provide the openings 32 to lighten the device.

The sine-bar 10 is pivotally supported on a rectangular base plate 33. At the rear corners of the base plate, pillow blocks 34 and 35 are provided having journals for rotatably receiving the opposite end portions of the rear plug 13. The sine-bar is so dimensioned and the pillow blocks so located with respect to the sine-bar that virtually no lateral shifting movement of the sine-bar is permitted relative to the base plate. The pillow blocks

are removably secured on the base plate by the screws 36.

At the front end of the base plate is provided a gage block supporting member 37. Member 37 is removably secured on the top surface of the base plate by the screws 38. The top surface 39 of the gage block supporting member is so located that when the sine bar is in its lower limiting position, shown in dotted lines in Figure 2, with plug 14 resting on surface 39, the plane through the centers of the plugs, and hence the apex of the V of V-block 20, will extend parallel to the bottom plane surface 40 of the base plate. It will also be noted that the top surface 39 is parallel to the plane through the plug centers and in a plane tangent to the lower side of the plug 13.

Actually, the bottom surface 40 of the base plate is determined by the rest pads 41 at the four corners of the base plate which extend slightly below the major portion of the bottom of the base plate. These pads are formed with grooves or serrations 42 as shown to prevent the collection of particles of matter which might get under the pads and destroy the accuracy of the instrument.

In use, the tool having a taper to be measured may be supported in the V of the V-block, or may be supported by the surfaces 30 and 31. Gage blocks may then be stacked upon the surface 39 of the gage block supporting member in an arrangement such that the sine bar and V-block are elevated to a point where the top surface of the taper measures zero when a taper measuring instrument is passed thereover, the taper measuring instrument being supported at precisely the same level as the bottom surface of the base plate. It is understood that the base plate will be resting upon a truly level surface which also supports the taper measuring instrument, since a sine bar is always used in conjunction with some true surface from which measurements can be taken.

The gage block supporting member 37 is also formed with a second surface 44 to one side of the surface 39 and spaced vertically therefrom. The surface 44 extends parallel to the surface 39 and thus provides a second surface for supporting a stack of gage blocks.

It often develops in employing a standard set of gage blocks, such as Johansson blocks, that the exact desired dimension cannot be obtained by building up a number of these blocks on a given gage block supporting surface. Therefore, by providing a second gage block supporting surface, such as surface 44, the range of dimensions that can be built up by standard blocks is greatly increased, and accordingly the range of tapers that can be checked is also increased.

It is contemplated in place of using a standard set of gage blocks, that in certain instances a special gaging block of a certain specified dimension may be provided. This is advantageous particularly in production or semi-production operation when a large number of tools having the same taper are being produced.

The instrument thus described is desirably formed of a high grade of tool steel.

What we claim as our invention is:

1. In combination, a sine bar having a plane bottom surface and a pair of integral depending legs at opposite sides thereof extending in spaced parallel relationship from front to rear of said sine bar, the rear end surfaces of said legs lying in a common plane perpendicular to said plane bottom surface and spaced forwardly of the rear end of said sine bar and cooperating with said plane bottom surface of said sine bar to define aligned recesses, the front end surfaces of said legs lying in a common plane parallel to the first-mentioned common plane spaced rearwardly of the front end of said sine bar and cooperating with said plane bottom surface of said sine bar to define aligned recesses, a first cylindrical plug extending transversely of said sine bar and secured in the first-mentioned recesses, a second cylindrical plug of the same diameter as and extending parallel to said first plug secured in the second-mentioned recesses, a base, means on said base rotatably supporting said first plug permitting swing-

ing movement of said sine bar about the axis of said first plug toward and away from said base, and a gage block support on the upper surface of said base beneath said second plug and engageable therewith upon swinging movement of said sine bar toward said base, said gage block support being located laterally inwardly of said depending legs to clear the latter and extending into the space between said depending legs upon swinging movement of said sine bar toward said base.

2. In combination, a sine bar having a plane bottom surface and a pair of integral depending legs at opposite sides thereof extending in spaced parallel relationship from front to rear of said sine bar, the rear end surfaces of said legs lying in a common plane perpendicular to said plane bottom surface and spaced forwardly of the rear end of said sine bar and cooperating with said plane bottom surface of said sine bar to define aligned recesses, the front end surfaces of said legs lying in a common plane parallel to the first-mentioned common plane spaced rearwardly of the front end of said sine bar and cooperating with said plane bottom surface of said sine bar to define aligned recesses, a first cylindrical plug extending transversely of said sine bar and secured in the first-mentioned recesses, a second cylindrical plug of the same diameter as and extending parallel to said first plug secured in the second-mentioned recesses, a base, means on said base rotatably supporting said first plug permitting swinging movement of said sine bar about the axis of said first plug toward and away from said base, a gage block support on the upper surface of said base beneath said second plug and engageable therewith upon swinging movement of said sine bar toward said base, said gage block support being located laterally inwardly of said depending legs to clear the latter and extending into the space between said depending legs upon swinging movement of said sine bar toward said base, and a V-block integral with said sine bar and projecting upwardly from the latter, said V-block having an elongated upwardly opening V-shaped recess having its apex extending in a plane perpendicular to said plugs and parallel to a plane through the axes of said plugs.

3. In combination, a sine bar having a plane bottom surface and a pair of integral depending legs at opposite sides thereof extending in spaced parallel relationship from front to rear of said sine bar, the rear end surfaces of said legs lying in a common plane perpendicular to said plane bottom surface and spaced forwardly to the rear end of said sine bar and cooperating with said plane bottom surface of said sine bar to define aligned recesses, the front end surfaces of said legs lying in a common plane parallel to the first-mentioned common plane spaced rearwardly of the front end of said sine bar and cooperating with said plane bottom surface of said sine bar to define aligned recesses, a first cylindrical plug extending transversely of said sine bar and secured in the first-mentioned recesses, a second cylindrical plug of the same diameter as and extending parallel to said first plug secured in the second-mentioned recesses, a base, means on said base rotatably supporting said first plug permitting swinging movement of said sine bar about the axis of said first plug toward and away from said base, a gage block support on the upper surface of said base beneath said second plug and engageable therewith upon swinging movement of said sine bar toward said base, said gage block support being located laterally inwardly of said depending legs to clear the latter and extending into the space between said depending legs upon swinging movement of said sine bar toward said base, and a V-block integral with said sine bar and projecting upwardly from the latter, said V-block having an elongated upwardly opening V-shaped recess having its apex extending in a plane perpendicular to said plugs and parallel to a plane through the axes of said plugs, said sine bar having a top surface at one side of said V-block extending parallel to a plane through the axes of said plugs, and said V-block having a surface extending perpendicular to the axes of said plugs and cooperating

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with top surface to define a recess of right angle configuration.

4. Structure as defined in claim 3 in which the sides of said V-shaped recess have opposed recesses therein for receiving enlargements of tools and the like to be measured. 5

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