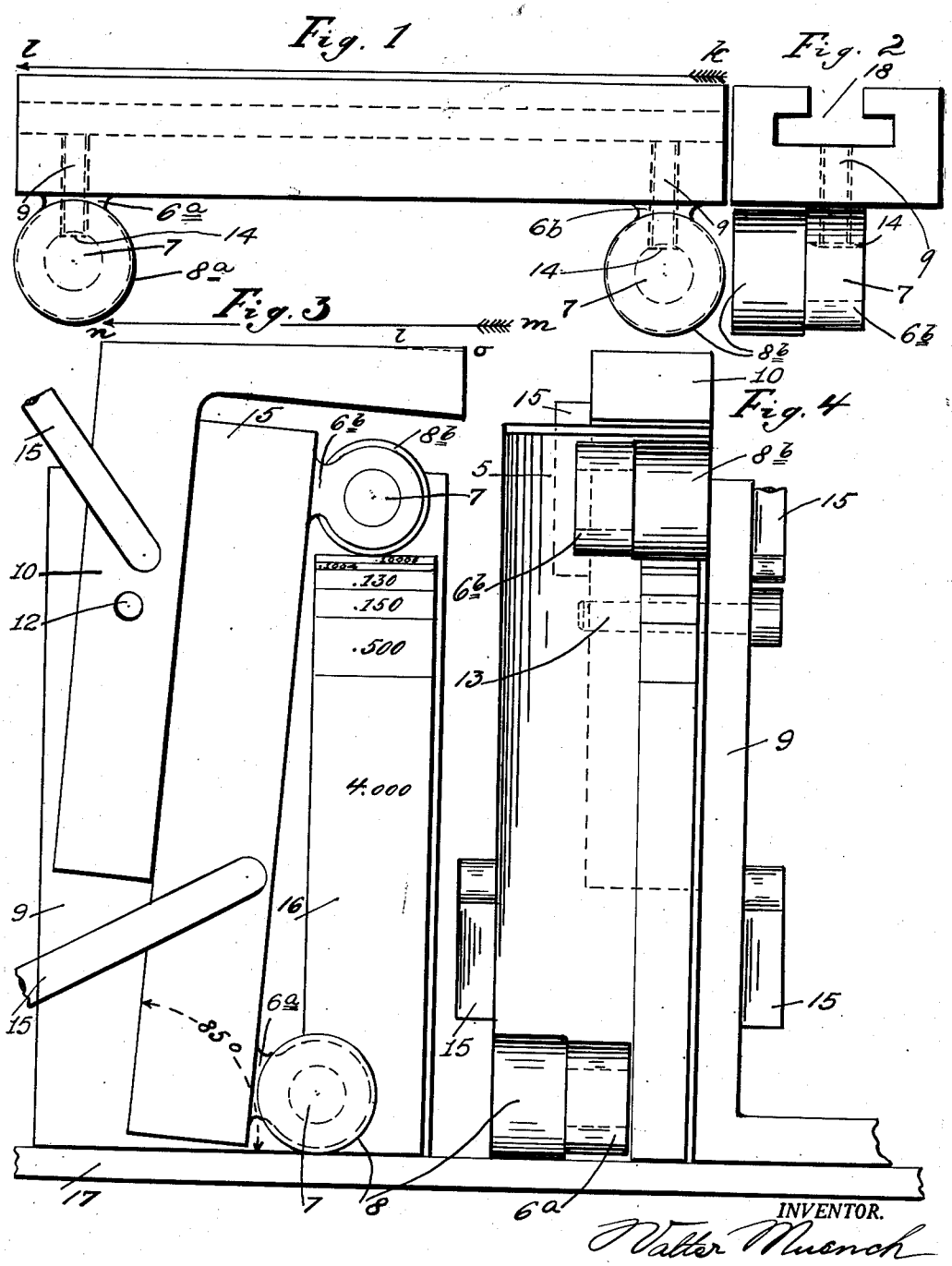
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SINE-BAR CONSTRUCTION

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SINE-BAR CONSTRUCTION

Walter Muench, Newark, N. J., assignor to Walter Muench, Incorporated, Newark, N. J., a corporation of New Jersey

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8 Claims. (Cl. 33—174)

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Sine-bars are used in machine shops, tool rooms and inspection departments.

These sine-bars are so made at present that two round discs are fastened to a hardened steel-bar on two pins and in another design two round discs are set into cut out corner sections at each end of a hardened steel-bar and are located exactly 5.00001 or 10.00001 inches apart.

In both cases only limited sections of the disc-curves can be utilized in setting up for angular work in connection with the usual angle-plates.

They are, therefore, impractical as they require an initial or starting size block on the low end of the sine-bar in most of the angular set ups.

To overcome these faults is the purpose of my invention herewith presented.

To enable others skilled in the art to fully comprehend the underlying features of my invention, that they may embody the same in various modifications in structure and relation contemplated, drawings, depicting a preferred form have been annexed as part of this disclosure and in such drawings similar characters denote corresponding parts throughout all the views, of which

Fig. 1 is a front elevation of the improved sine-bar.

Fig. 2 is an end elevation in the direction of the arrow shown in Fig. 1.

Fig. 3 is a front elevation of a modified form of the improved sine-bar fastened to an angle plate with the addition of a piece of work and showing a set-up made by the use of Johanssen size blocks.

Fig. 4 is an end elevation in the direction of the arrow shown in Fig. 3.

Referring now to the drawings wherein like characters designate corresponding parts throughout the several views, 5 designates in its entirety the steel bar which is provided at each end with an extended lug 6*a* and 6*b*. In each lug a hole is bored and into each hole is fitted the shank 7, 7 of the disc 8*a* and 8*b*. In Figs. 1 and 2 a flat 14 is provided on each shank 7, 7, so that set-screws positioned in threaded holes in the steel bar 5, can hold the discs 8*a* and 8*b* securely in place.

In Fig. 1 and Fig. 2 the discs 8*a* and 8*b* are shown in front of the lugs 6*a* and 6*b* as viewed in Figure 1.

This arrangement will be used mostly in the shops where a vernier height-gage, reading only in 1/1000 of an inch is the best at hand.

In such circumstances it is an established fact and a necessity for the sake of closest accuracy

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in calculating the setting of a sine-bar from the constants of a five place table of natural sines, to tip the angle plate on its side and figure the setting of the sine-bar to the complemental angle of 30 degrees, when an angle of 60 degrees is required for a piece of work that is to be fastened to the angle plate for a machining operation and which must be done in an up-right position of the angle-plate.

However, there arise occasions in a set-up for machining or grinding operations and more so in an inspection department when the sine-bar must be set directly to the required angle of say 85 degrees and the tipping of the angle plate to the side for a complement angle set up of 5 degrees in this case, is not feasible.

A case of this nature is illustrated in Figs. 3 and 4, where the sine-bar 5 is clamped to the angle plate 9 and onto which is also clamped the work-piece 10, which is to be ground on the top to several specified precision angles relative to a pivot point and for which reason the work piece 10 is provided with a hole 12 into which fits snugly the positioning stud 13 that is being solidly held in the angle plate by a light press fit.

As is clearly shown in Figs. 3 and 4, the initial lower or starting disc 8*a* is resting directly on the surface plate 17.

It should be especially pointed out that the starting disc 8*a*, resting directly on the surface plate is in front of or toward the observer with relation to the lug 6*a* as viewed in Figure 3, and the other disc 8*b* is behind the lug 6*b* as viewed in said figure.

With the initial or better called the starting disc 8*a* resting directly on the surface plate 17, it is now only necessary to put Johanssen size blocks 16 to the equivalent of 4.98095 inches under the disc 8*b* in order to set the sine-bar, in this case of 5.00001 inch spacing between the two discs, to the precise angle of 85 degrees which is the angle required for the work piece 10, so that it may be ground on the top.

As soon as this grinding operation is done the work piece 10 must be shifted or rather swung on the pivot-stud 13 into a position to grind the short corner section on the line 1—o on top, to a precision angle that requires the sine-bar to be shifted to an 86 degrees position.

For this 2nd operation the two parallel-clamps 15, 15 which hold the work-piece and the sine-bar in the 85 degree angular setting are now loosened up sufficiently to permit a shifting into the new position of 86 degrees and for which

purpose it is now necessary to remove the stack of Johanssen size-blocks 16 used for the 85 degree setting and put a new stack to the equivalent of 4.9878 inches under the disc 8b.

In this new sine-bar the peripheral disc curve is so large or better stated, extensive, that the sine-bar can be set up for angles from 1 to 89 degrees, directly; including, calculatively, minutes and seconds for each degree.

A stack of size blocks to five decimals is used for the set up shown in Figs. 3 and 4 for an angle of 85 degrees.

If, in this set-up the disc 8b is placed in front of the lug 6b, then the stack of size blocks measuring 4.98095 cannot be placed under the disc 8b as the lower disc 8a is in the way in this high elevation of the disc 8b for an 85 degree angle.

In order now to facilitate the use of size blocks in a set-up as shown in Figs. 3 and 4, the high raised disc 8b must be placed behind the lug 6b, by which arrangement it is an easy task to apply any stack of size blocks in a most convenient way.

The sine-bar shown in Figs. 3 and 4 is without set-screws bearing on the shank 7. In this model the discs 8a and 8b are held in a fixed stationary position and cannot be removed except for repairs and adjustment in case of accidental damage.

The T-slot 18 is provided in the sine-bar for the purpose to fasten conveniently a small angle plate or a small vise on top of the sine-bar to facilitate the holding of small work pieces for machining or grinding to angular measures.

While I have illustrated and described my invention with some degree of particularity, I realize, that in practice various alterations therein may be made.

Having described my invention, what I claim as new and desire to secure by United States Letters Patent is:

1. An elongated sine bar having a main body equipped with a plane obverse or work engaging face and a reverse face, two mounting lugs projecting perpendicularly from said reverse face one adjacent each end of said reverse face and with both said lugs lying in a median plane perpendicular to said obverse face, and a disk fixedly attached to and projecting laterally from each lug one at one corner of said reverse face and the other at the diagonally opposite corner of said reverse face thereby to place said disks in spaced parallel planes perpendicular to the obverse face, the peripheries of the disks bearing parallel spaced relation and being circular in shape with their centers lying in a common plane paralleling said obverse face.

2. A sine-bar structure as defined in claim 1, in which the main body is rectangular in cross section and includes two parallel side faces in addition to the obverse and reverse faces which bear perpendicular relation to said side faces, one said face having a T-groove therein in which to removably receive work-holding vices, angle plates or the like.

3. A sine-bar structure as defined in claim 1, in which the main body obverse face is provided with a T-groove therein in which to removably receive work-holding vices, angle plates or the like.

4. An elongated sine bar having a main body equipped with a plane obverse or work engaging face and a reverse face, two mounting lugs projecting perpendicularly from said reverse face one adjacent each end of said reverse face and each having a mounting aperture therein, and two identical circular disks each having a mounting shank mounted in one of said apertures, each said disk lying in a plane perpendicular to the obverse face, the centers of said mounting apertures being spaced a like distance from said reverse face greater than the radius of each disk and the centers of said disks lying in a common plane paralleling said obverse face, and the peripheries of said disks having a common tangent parallel to said obverse face, said mounting lugs lying in a common plane perpendicular to the plane of the obverse face and being spaced inwardly from both sides of the reverse face so as to provide a space at each side of each lug and within the width of the bar in which to receive a disk, and each of said mounting shanks projecting from one side of one of the disks and being removably mounted in one of the lug apertures so as to be insertable in said lug aperture selectively from one side or the other.

5. An elongated sine bar having a main body equipped with a plane obverse or work engaging face and a reverse face, two mounting lugs projecting perpendicularly from said reverse face one adjacent each end of said reverse face and each having a mounting aperture therein, and two identical circular disks each having a mounting shank mounted in one of said apertures, each said disk lying in a plane perpendicular to the obverse face, the centers of said mounting apertures being spaced a like distance from said reverse face greater than the radius of each disk and the centers of said disks lying in a common plane paralleling said obverse face, and the peripheries of said disks having a common tangent parallel to said obverse face, said mounting lugs lying in a common plane perpendicular to the plane of the obverse face and being spaced inwardly from both sides of the reverse face so as to provide a space at each side of each lug and within the width of the bar in which to receive a disk, and each of said mounting shanks projecting from one side of one of the disks and being removably mounted in one of the lug apertures so as to be insertable in said lug aperture selectively from one side or the other, whereby both disks can be placed at one side or the other of the sine bar, or one said disk may be placed at one side and the other at the opposite side of the sine bar.

6. An elongated sine bar having a main body equipped with a plane obverse or work engaging face and a reverse face, two mounting lugs projecting perpendicularly from said reverse face one adjacent each end of said reverse face and each having a mounting aperture therein, and two identical circular disks each having a mounting shank mounted in one of said apertures, each said disk lying in a plane perpendicular to the obverse face, the centers of said mounting apertures being spaced a like distance from said reverse face greater than the radius of each disk and the centers of said disks lying in a common plane paralleling said obverse face, and the peripheries of said disk having a common tangent parallel to said obverse face, said mounting lugs lying in a common plane perpendicular to the plane of the obverse face and being spaced inwardly from both sides of the reverse face so as to provide a space at each side of each lug and within the width of the bar in which to receive a disk, and each of said mounting shanks projecting from one side of one of the disks and being removably mounted

in one of the lug apertures so as to be insertable in said lug aperture selectively from one side or the other, whereby both disks can be placed at one side or the other of the sine bar, or one said disk may be placed at one side and the other at the opposite side of the sine bar, each said mounting shank having a sliding fit in one of the mounting apertures and including a flattened face extending into the respective mounting aperture, and there being included on each lug a set screw engageable with the flat face of the respective mounting shank to secure the particular shank supported disk in place.

7. An elongated sine bar having a main body equipped with a plane obverse or work engaging face and a reverse face paralleling said obverse face, two mounting lugs projecting in a common plane perpendicularly from said reverse face and constituting the only space obstructing projections from said reverse face throughout the full length thereof one adjacent each end of said reverse face and each having a mounting aperture therein, and two identical circular disks each having a mounting shank mounted in one of said apertures, one of said two disks lying at one side of the lug at one end of the body and the other of said two disks lying at the other side of the lug at the other end of the body and each said disk lying in a plane perpendicular to the obverse face, the centers of said mounting apertures being spaced a like distance from said reverse face greater than the radius of each disk and the centers of said disks lying in a common plane paralleling said obverse face.

8. An elongated sine bar having a main body equipped with a plane obverse or work engaging face and a reverse face, a single disk adjacent each end of the reverse face, each said disk having a peripheral surface at least in part cylindrical, said at least in part cylindrical surfaces being of like radius, and means mounting said disks

on the bar with said at least in part cylindrical surfaces bearing parallel spaced relation one to the other and presented for contact with a base plate or a gage block and with the centers of said at least in part cylindrical surfaces spaced a like distance from said reverse face at least as great as the radius of said at least in part cylindrical surfaces and lying in a common plane paralleling said obverse face and with the disks disposed in laterally spaced distinct planes bearing parallel relation one to the other and perpendicular to the obverse face and constituting the only space obstructing projections in said distinct planes from one end to the other of the body opposite said reverse face thereof so that said obverse face can be placed at angles closely approaching the perpendicular with one disk having its at least in part cylindrical surface contacting a base plate and the other disk having its at least in part cylindrical surface contacting gage block means with said first mentioned disk positioned laterally of said block means without interference therewith.

WALTER MUENCH.

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