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(54) Drill stand.

(57) A drill stand for supporting a drill in position with respect to a workpiece and advancing said drill to perform a drilling operation. The stand includes a base (10) and a pair of spaced rods (18,19) extending upwardly therefrom in substantially parallel alignment. Each rod is pivotally connected to the base and the rods may pivot together through desired angles with respect to the base. The pivotal connections preferably incorporate clutch components (21,43,44,25,-45,46) capable of creating a controlled interference fit securely to clamp the rods in a desired angular position. A drill supporting bridge (32) interconnects the posts and is slidable therealong toward and away from the base. The base is further adapted (11,12) to accommodate a workpiece.

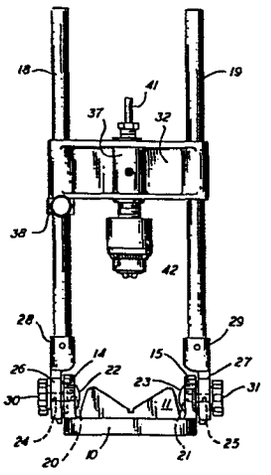

FIG. 1

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DRILL STAND

This invention relates to machine tools and is concerned with an improved drill stand.

Drill stands are known in the art which serve to support both a drill and a workpiece in their desired relative operating positions. Consequently, the drill stand serves not only as a support for the drill but as a centering guide.

Such drill stands generally comprise a base with a pair of upstanding rods extending upwardly from the base in spaced relation. A brace interconnects the rods and is longitudinally slidable thereon. The brace serves as a support for a hand drill and provides means whereby a drill bit can be accommodated in a chuck drivable by the hand drill. A workpiece to be drilled is supported by the base at a location below and aligned with a drill bit accommodated in the chuck. In this manner a drilling operation may be performed by advancing the brace, together with the supported drill assembly, along the rods in the direction towards the workpiece. Upon completion of the drilling operation, the brace is removed by movement along the supports in the opposite direction.

U.S. Patent 1,895,990 to Harcharick discloses a rudimentary support for a hand drill in which the brace is spring loaded to bias the supported hand drill away from the drilling position. U.S. Patent 2,454,372 to Billeter shows a more elaborate arrangement of a drill and drill jig bushing carrier attachment intended primarily for use in multiple spindle drill presses.

U.S. Patent 2,997,900 to Pugsley again shows a portable drill stand in which a drill supporting brace extending between rods is spring loaded to bias the supported drill away from the workpiece. In the Pugsley disclosure the workpiece is clamped between two collars, one of which provides an abutment for the biasing springs.

In all of the above disclosed prior patents, the support rods extend upwardly from the base at right angles thereto. No provision is made for orienting the support rods in parallel relation with respect to the base and, consequently, such drill stands only permit drilling normal to the workpiece. U.S. Patent 3,874,810 to Russell permits drilling the workpiece in directions other than normal thereto. Russell achieves this by extending the support rods through the base by adjustable amounts. By making the support rods project, by adjustable amounts, through the base, the drill stand may also be positioned on uneven workpieces or mounts.

The present invention provides an improvement over and above the teaching of the prior art drill stands by permitting drilling to be accomplished at readily adjustable angles with respect to the workpiece.

According to the present invention there is provided a drill stand comprising a base, a drill support upstanding from said base and supports for locating a workpiece on said base, characterized in that the drill support includes a pair of spaced rods pivotally mounted on said base and interconnected by a bridge member adapted to receive a hand drill and to retain said rods in substantially parallel relationship for pivotal movement in unison with respect to said base.

According to a preferred aspect of the invention there is provided a drill stand comprising a base, a drill support upstanding from said base and supports for locating a workpiece on said base, characterized by a pair of lugs integral with said base and upstanding therefrom in spaced relationship, a pair of spaced support rods

pivotally mounted one on each of said lugs cooperating rib and groove clutch components provided on at least one of said rods and the associated mounting lug and clamps adapted to cooperate with said clutch components securely to clamp said rod in a desired angular position with respect to said base, a bridge having a sleeve at each end, said sleeves being slidable on said rods with a relatively close fit whereby said bridge extends between the rods, is slidable longitudinally thereon and retains said rods in substantially parallel alignment for movement about a common pivotal axis, and a spindle mounted on said bridge intermediate the ends thereof and lying substantially parallel to the support rods, said spindle having a drill bit receiving chuck at the end thereof directed toward said base and being adapted, at its opposite end, to be rotated by an electric drill.

In order that the present invention may be more clearly understood and readily carried into effect, a preferred embodiment thereof will now be described with reference to the accompanying drawings in which:

Figure 1 is an end view of a preferred drill stand constructed in accordance with the invention;

Figure 2 is a side elevation of the drill stand shown in Figure 1;

Figure 3 is a view similar to Figure 2 but showing components of the drill stand occupying a different adjusted position;

Figure 4 is an enlarged perspective view showing the drill stand in the position shown in Figures 1 and 2; and

Figure 5 is a further enlarged exploded perspective view of a detail of the drill stand.

Referring now to the drawings, a base 10 is provided with spaced upstanding flanges 11, 12 for supporting a workpiece (not shown). As shown in the drawings, each flange 11, 12 has an upwardly directed surface which defines a V-shaped notch. In the operative

drilling position the workpiece spans the flanges 11, 12 and is seated in the V-shaped notches.

For reasons which will become apparent from the following description, the base 10 is preferably generally in the form of an annulus defining a central well 13. As most clearly shown in Figure 4 of the drawings, the flanges 11, 12 upstand on opposite sides of the well 13.

In addition to the upstanding flanges 11, 12, two lugs 14, 15 also extend upwardly from the base 10. These lugs are located on opposite sides of the well 13 and are in alignment with each other. The axis extending between the lugs 14, 15 extends substantially at right angles to the axis of alignment of the flanges 11, 12.

Finally, with regard to the base, leveling screws 16, 17 may extend through the base. These leveling screws are seated in threaded bores extending through the base and in this manner any irregularity in the surface on which the base is stood may be compensated for by appropriate adjustment of the leveling screws.

Twin guide posts or rods 18, 19 are pivotally mounted on the lugs 14, 15 and may be adjusted to extend above the base an any predetermined angle.

To this end the lugs 14, 15 have aligned apertures 20, 21 extending therethrough respectively to accommodate bolts 22, 23. These bolts extend also through mating apertures 24, 25 in flanges 26, 27 integral with rod supporting collars 28, 29. The collar 28 is mounted on the lower end of the rod 18 and is secured thereto by any suitable means such as, for example, a grub screw 30. Similarly, the collar 29 is securely attached to the lower end of the rod 19.

Assembly of these parts of the drill stand is completed by tightening nuts 30, 31 respectively threadedly mounted on the bolts 22, 23.

By slackening the nuts 30, 31 the rods 18, 19 are free to pivot through an arc about the axis defined by the aligned bolts. The rods are mounted in parallel and

pivot in unison. This is accomplished by a brace or bridge 32 which extends between the rods 18, 19 and is longitudinally slidable thereon. As best shown in Figure 4 of the drawings, the brace or bridge 32 has upper and lower flanges 33, 34 which impart rigidity to the bridge. The bridge also comprises three sleeves 35, 36, 37, one at each end and one in the center of the structure. The sleeve 35 is slidably mounted on the rod 18 whilst the sleeve 36 is slidably mounted on the rod 19.

The position of the bridge 33 at desired locations along the length of the rods 18, 19 may be controlled by adjustable stops. In the embodiment shown in the drawings, two alternative forms of stop are shown. A collar 38 is shown slidably mounted on the rod 18 and a tightening or set screw 39 extends through the collar. In this manner the position of the collar 38 along the length of the rod 18 may be selected whereupon the screw 39 is turned to clamp the collar 38 in the selected position. When the collar is so clamped in position, downward movement of the bridge is limited by the collar. Alternatively, a tightening or set screw may extend through one of the sleeves 35, 36. Figure 4 shows a tightening screw 40 extending through the sleeve 36. Such a tightening screw 40 serves to locate the position of the bridge 33 along the length of the rods 18, 19 but does not define a limiting abutment for restricting movement of the bridge.

The third sleeve 37 is located in the center of the bridge 32 and has a spindle 41 extending therethrough. The spindle end which is directed downwardly towards the base 10 receives a chuck 42. The chuck is a conventional drill chuck and has jaws which may be expanded and contracted respectively to release and to grasp a drill bit. As the chuck is of well known and conventional construction, its component parts and operation will not be described in detail.

The opposite end of the spindle 41 is drivable by an electric hand drill, not shown. To this end the spindle 41 may be directly attached to the drill motor or,

alternatively, may be grasped by a further chuck which is part of the electric drill. In any event, the electric drill rotates the spindle 41 and the chuck 42.

Finally, with regard to the construction of the drill stand, the provision of leveling screws 16, 17 has already been described. However these screws serve more than one purpose. In addition to facilitating leveling of the drill stand, if the lead ends (not shown) of the screws are pointed, then the screws may be advanced through the base 10 to present sharp points depending from the underside of the base. These points will then serve to anchor or restrain movement of the drill stand either by impinging a relatively soft bench or table or by resisting movement on a relatively hard surface by increasing the friction between the underside of the base and such surface.

Whilst the foregoing description describes the drill stand as supporting a workpiece to be drilled on the flanges 11, 12, the stand may also seat over the workpiece. In this case the well 13 permits the drill bit to pass through the base to engage the workpiece. When drilling in this manner the screws 16, 17 may be used to straddle and center a workpiece lying under the base 10.

A drilling operation in which a workpiece is seated on the V-shaped flanges 11 and 12 and extends across the well 13 will now be described. A drill bit, not shown, having the desired diameter is clamped in the chuck 42 and the drill is secured to the opposite end of the spindle 41. The screw 39 is loosened and the collar 38 is downwardly displaced to form an abutment at which the clamped drill bit extends to its predetermined maximum depth. Thereupon the screw 40 is loosened to permit movement of the bridge along the rods 18 and 19 and the drill is activated. It is then merely a matter of advancing the drill, by sliding the bridge 32 downwardly towards the base 10, to cause the rotating drill bit to drill the seated workpiece. When the desired

drilling has been accomplished, the drill, bridge 32, chuck 42 and drill bit are retracted at which point the screw 40 may again be tightened to hold the drilling apparatus in the raised inoperative position.

It will be appreciated that the provision of the hollow well 13 beneath the seated workpiece will permit the drill to pass cleanly through the workpiece if desired.

Although in most normal drilling operations drilling will be effected in a direction normal to the workpiece, it is nevertheless frequently desired to drill at an angle.

Drilling in a direction normal to the workpiece is accomplished when the guide posts or rods 18, 19 extend perpendicularly upwardly from the base 10 as shown in Figures 1, 2 and 4 of the drawings. Figure 3 of the drawings, on the other hand, shows the posts firmly clamped at an angle with respect to the base whereby the drill bit will drill at an angle.

It has already been explained how the nuts 30 and 31 may be slackened to permit the rods 18 and 19 to pivot through an arc about the axis defined by the aligned bolts 22 and 23. However, it will be appreciated that when the nuts 30 and 31 are tightened to hold the rods 18 and 19 in the predetermined desired position it is essential that a firm clamping be effected.

In order to effect the necessary firm clamping, one or more clamps which operate essentially in the manner of a cone clutch may be utilized. In the embodiment shown in the drawings, each of the bolt and nut assemblies 22, 30 and 23, 31 is associated with such a clamp. The clamp is best shown in the exploded perspective view shown in Figure 5 of the drawings. That figure shows how the outwardly directed face of the lug 15 is provided with two annular grooves 43, 44 disposed concentrically around the aperture 21. The figure also shows how the inwardly directed face of the juxtaposed flange 27 has two annular

ribs 45, 46 disposed concentrically around the aperture 25. In the assembled position the ribs 45, 46 seat in the grooves 43, 44 respectively.

The walls of the grooves flare outwardly from the base to the inwardly directed surface of the lug 15 and the grooves correspondingly taper from their base to their apex. However, there is a deliberate mis-match between the geometrical configurations of the ribs and grooves whereby an interference jamming effect is obtained when the nut 31 is tightened on the bolt 23. This jamming interference serves securely to hold the flange 27 and hence the rod 19 in the desired position. As has already been pointed out, a similar configuration is provided at the base of the rod 18.

Figure 5 also shows most clearly a calibrated angular scale provided around the hemispherical upper surface of the lug 15 and a pointer 47 provided on the underside of the collar 29 to indicate the angle of tilt before the nut 31 is tightened on the bolt 23. A similar angular scale is provided on the lug 14 to facilitate appropriate orientation of the drill.

The foregoing description with reference to the drawings has described in detail the preferred embodiment of the invention. It will be appreciated that the drill stand of the invention enables an operator readily to drill a workpiece at any predetermined angle since the drill stand can be easily and accurately adjusted to align the drill bit at that angle. Although the preferred embodiment has been described, it will be appreciated that modifications may be made thereto within the scope of the accompanying claims.

C L A I M S

1. A drill stand comprising a base (10), a drill support upstanding from said base and supports (11,12) for locating a workpiece on said base, characterized in that the drill support includes a pair of spaced rods (18,19) pivotally mounted on said base (10) and interconnected by a bridge member (32) adapted to receive a hand drill and to retain said rods in substantially parallel relationship for pivotal movement in unison with respect to said base.

2. A drill stand according to claim 1, characterized in that first and second lugs (14,15) upstand from said base (10) and have aligned apertures (20,21) extending therethrough and in that the support rods (18,19) are pivotally mounted one on each of said lugs by fasteners (22,30,23,31).

3. A drill stand according to claim 2, characterized in that the lower end of each of said support rods (18,19) terminates in a flange (26,27) having an aperture (24,25) extending therethrough and in that the fasteners comprise bolts (22,23) extending through the apertures in the lugs and flanges to receive tightening nuts (30,31).

4. A drill stand according to claim 3, characterized in that the juxtaposed faces of the lug and the flange at the lower end of at least one of said support rods are profiled to provide a secure clamping effect upon tightening of the nut.

5. A drill stand according to claim 4, wherein the face of at least one of the lugs directed towards the associated flange has at least one annular groove (43,44) disposed around the aperture (21) and in that a cooperating annular rib (45,46) is provided on the lug facing face of the flange (27) around the aperture (25), said groove and rib being similarly shaped but having different dimensions to provoke an interference fit upon tightening of the nut on the bolt.

6. A drill stand according to any of claims 1 to 5, characterized in that the bridge member (32) carries a spindle (41), one end of said spindle being adapted to receive a chuck (42) and the other end of said spindle

being drivable by an electric drill.

7. A drill stand according to claim 6, characterized in that each end of the bridge member (32) terminates in a sleeve (35,36), said sleeves being arranged to seat over and slide along the support rods (18,19).

8. A drill stand according to claim 7, characterized in that a set screw (40) extends through one of said sleeves (36) for tightening against the rod (19) selectively to hold the bridge member (32) in any desired position on the rods.

9. A drill stand according to any of claims 1 to 7, characterized in that a collar (38) is slidable on one of said support rods (18) and has a set screw (39) extending therethrough selectively to clamp said collar in a desired position on the rod.

10. A drill stand comprising a base (10), a drill support upstanding from said base and supports (11,12) for locating a workpiece on said base, characterized by a pair of lugs (14,15) integral with said base (10) and upstanding therefrom in spaced relationship a pair of spaced support rods (18,19) pivotally mounted one on each of said lugs (14,15), cooperating rib (45,46) and groove (43,44) clutch components provided on at least one of said rods and the associated mounting lug and clamps (22,30,23,31) adapted to cooperate with said clutch components securely to clamp said rod in a desired angular position with respect to said base, a bridge (32) having a sleeve (35,36) at each end, said sleeves being slidable on said rods with a relatively close fit whereby said bridge extends between the rods, is slidable longitudinally thereon and retains said rods in substantially parallel alignment for movement about a common pivotal axis, and a spindle (41) mounted on said bridge (32) intermediate the ends thereof and lying substantially parallel to the support rods (18,19), said spindle having a drill bit receiving chuck (42) at the end thereof directed toward said base and being adapted, at its opposite end, to be rotated by an electric drill.

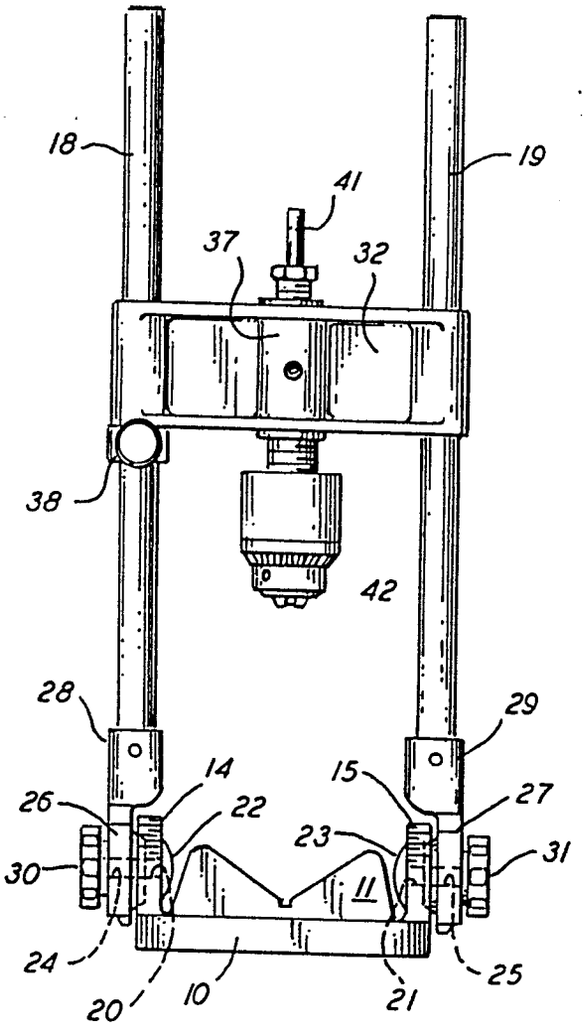

FIG. 1

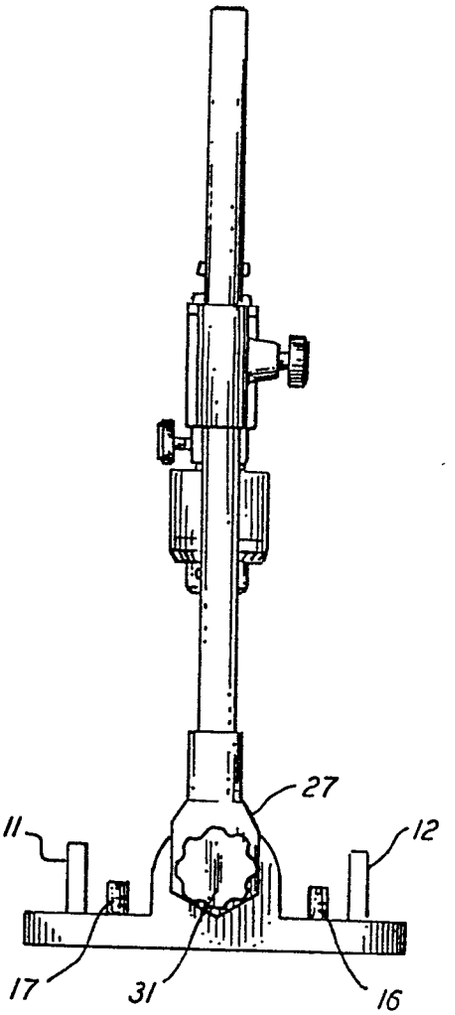

FIG. 2

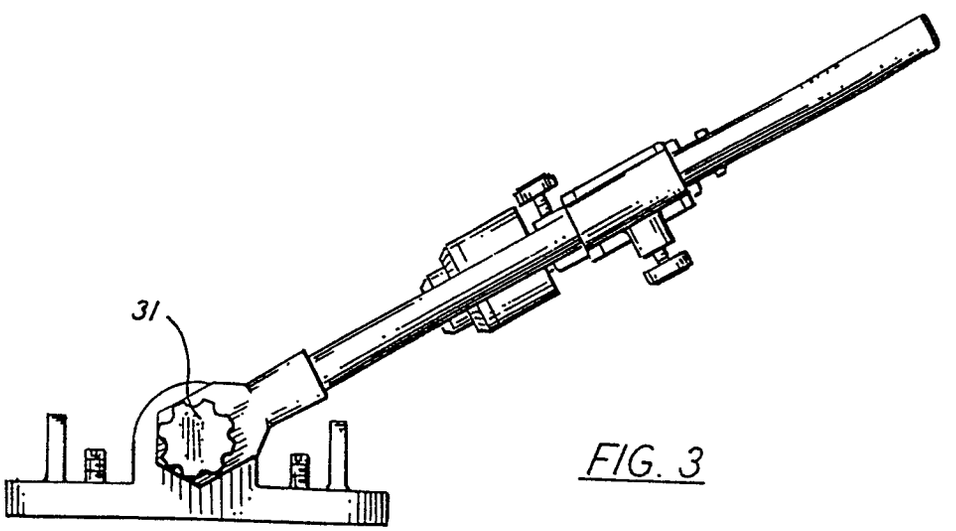

FIG. 3

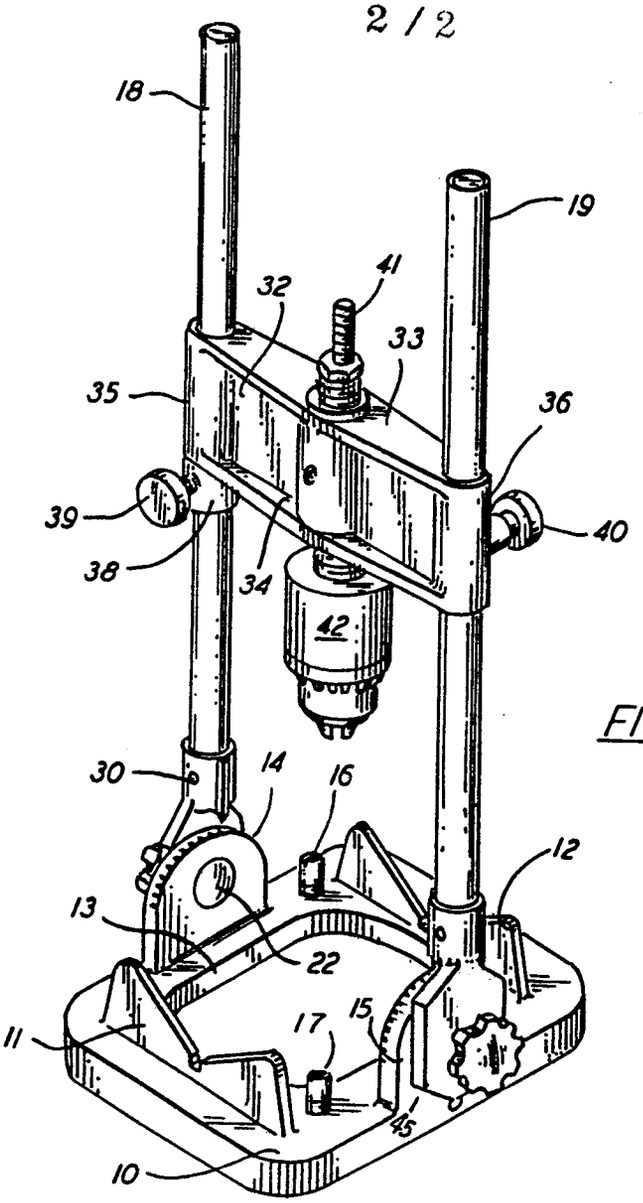
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FIG. 4

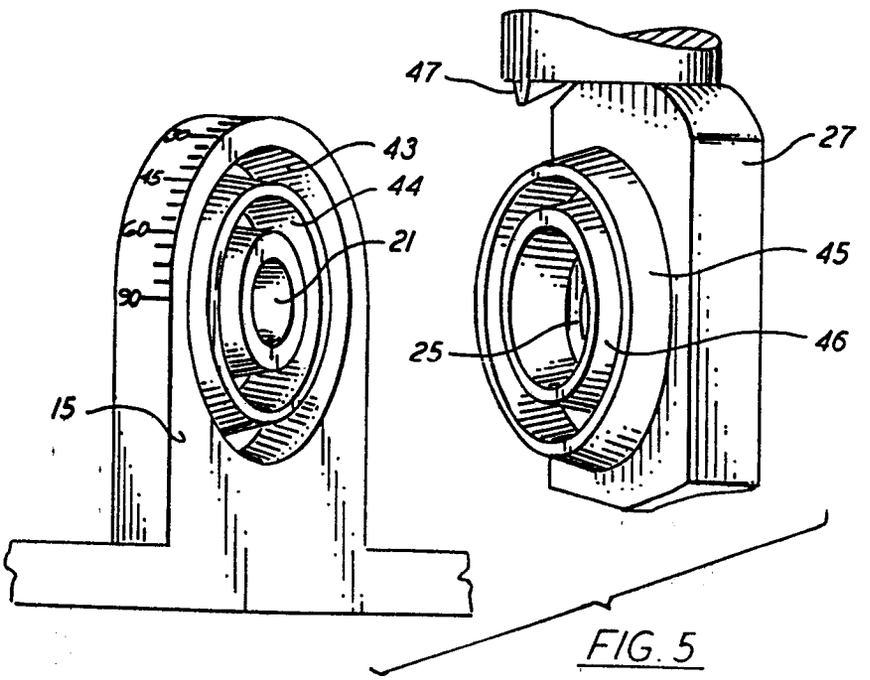
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FIG. 5