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Boyajian

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[45] **Oct. 1, 1974**

[54] **DRILL GUIDE**

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[21] Appl. No.: **387,471**

[52] **U.S. Cl.** **408/75,** 408/87, 408/100, 408/112, 408/712, 408/236

[51] **Int. Cl.** **B23b 45/14,** B23b 49/00

[58] **Field of Search** 408/75, 87, 95, 100, 112, 408/115, 712, 236

[56] **References Cited**

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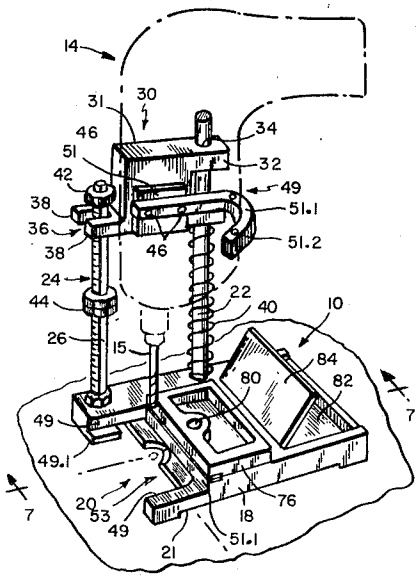
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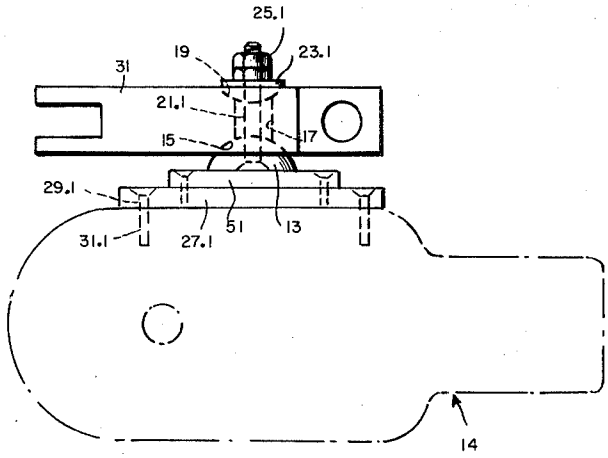
Primary Examiner—Francis S. Husar
Attorney, Agent, or Firm—Dike, Bronstein, Roberts, Cushman & Pfund

[57] **ABSTRACT**

A drill guide comprising a base, post fixed to the base, a carriage mounted on the post for movement toward and from the base, and an adjustable coupling on the carriage for securing a power drill thereto with the axis of the drill at a predetermined angle to the base, said carriage being adapted to be removed to enable using the drill independently of the base and to be restored without readjustment to said predetermined position. The coupling supports the drill forwardly and laterally of the post substantially centered with respect to the base and the base contains an opening through which the drill may be lowered into engagement with the work. There is means in the form of a second post for guiding the carriage as it is raised and lowered, a spring yieldably supporting the carriage above the base for movement toward the base, and means for limiting downward and upward movement of the carriage relative to the base. A gauge plate is adjustably mounted on the base below the opening and has on it intersecting gauge marks adapted to be aligned with the axis of the drill. A platen corresponding in configuration to the opening in the base is hingedly supported in the opening in which position its surface is flush with the surface of the base and for movement from the opening to a folded back position away from the opening.

28 Claims, 13 Drawing Figures





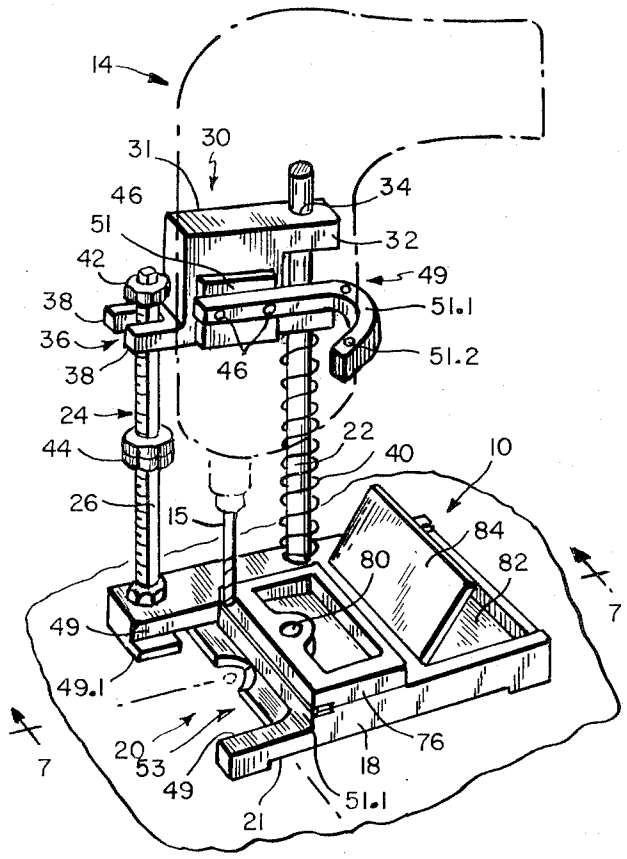


FIG. 1

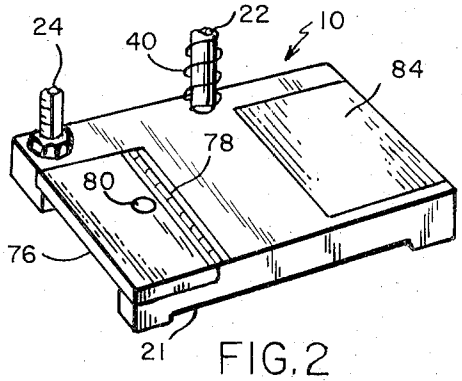


FIG. 2

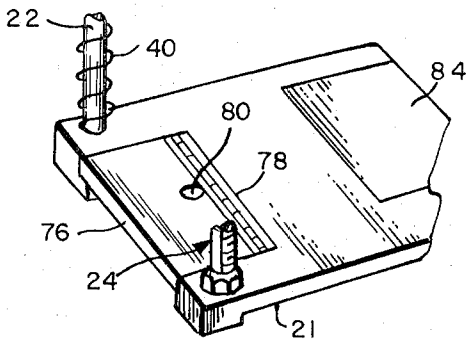


FIG. 3

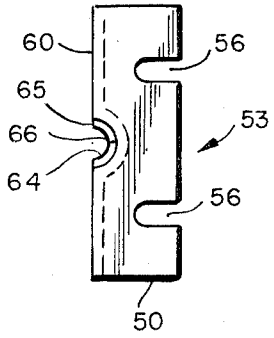


FIG. 4

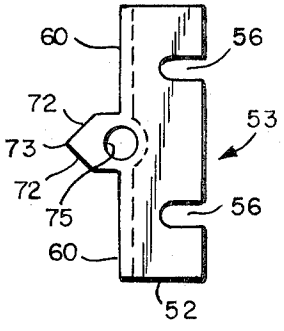


FIG. 5

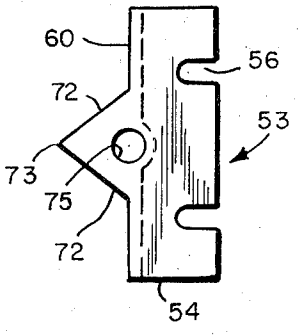


FIG. 6

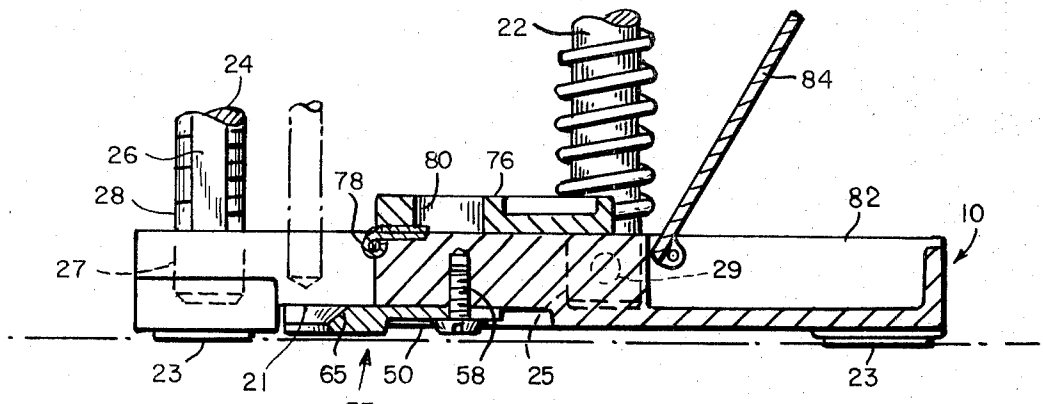


FIG. 7

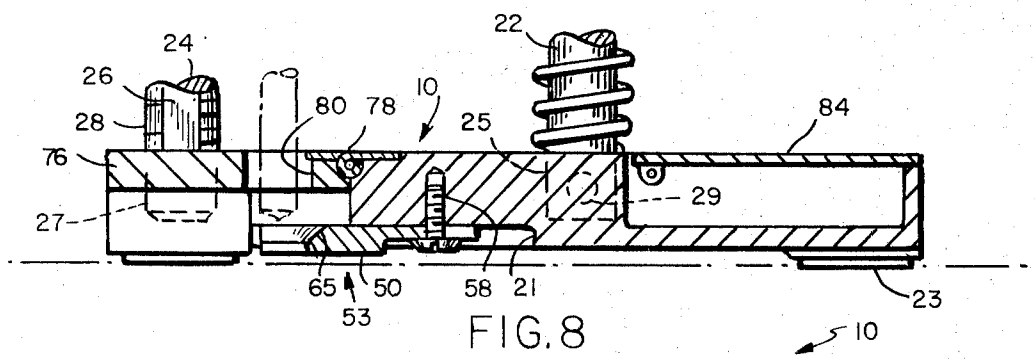


FIG. 8

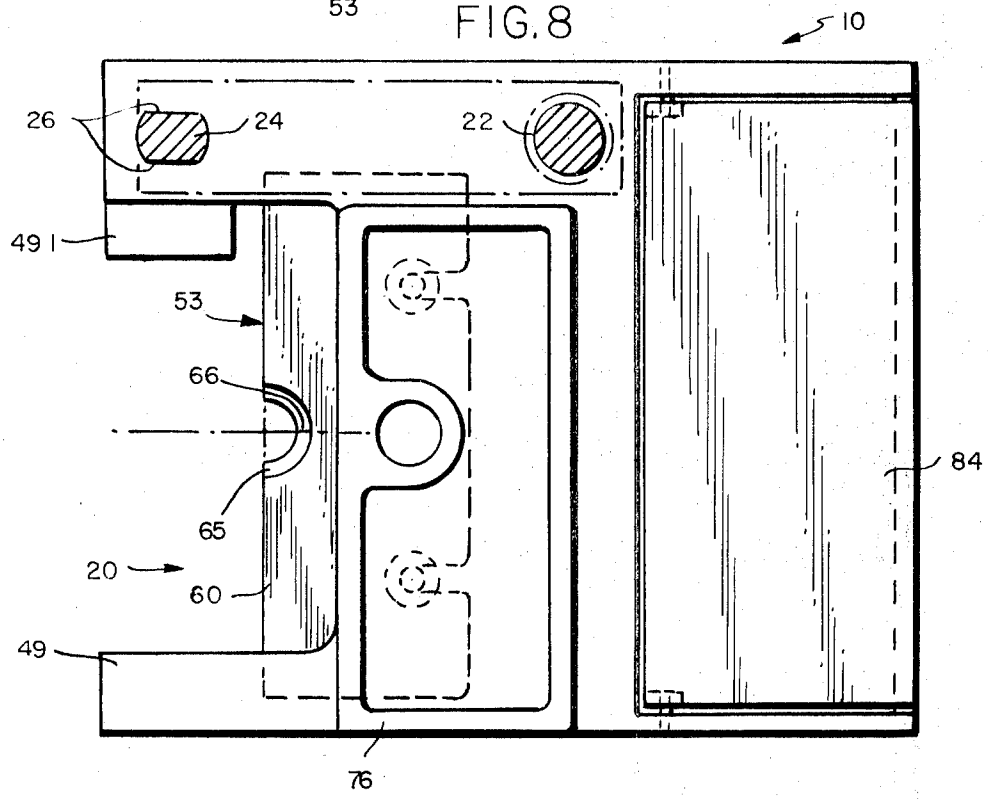


FIG. 9

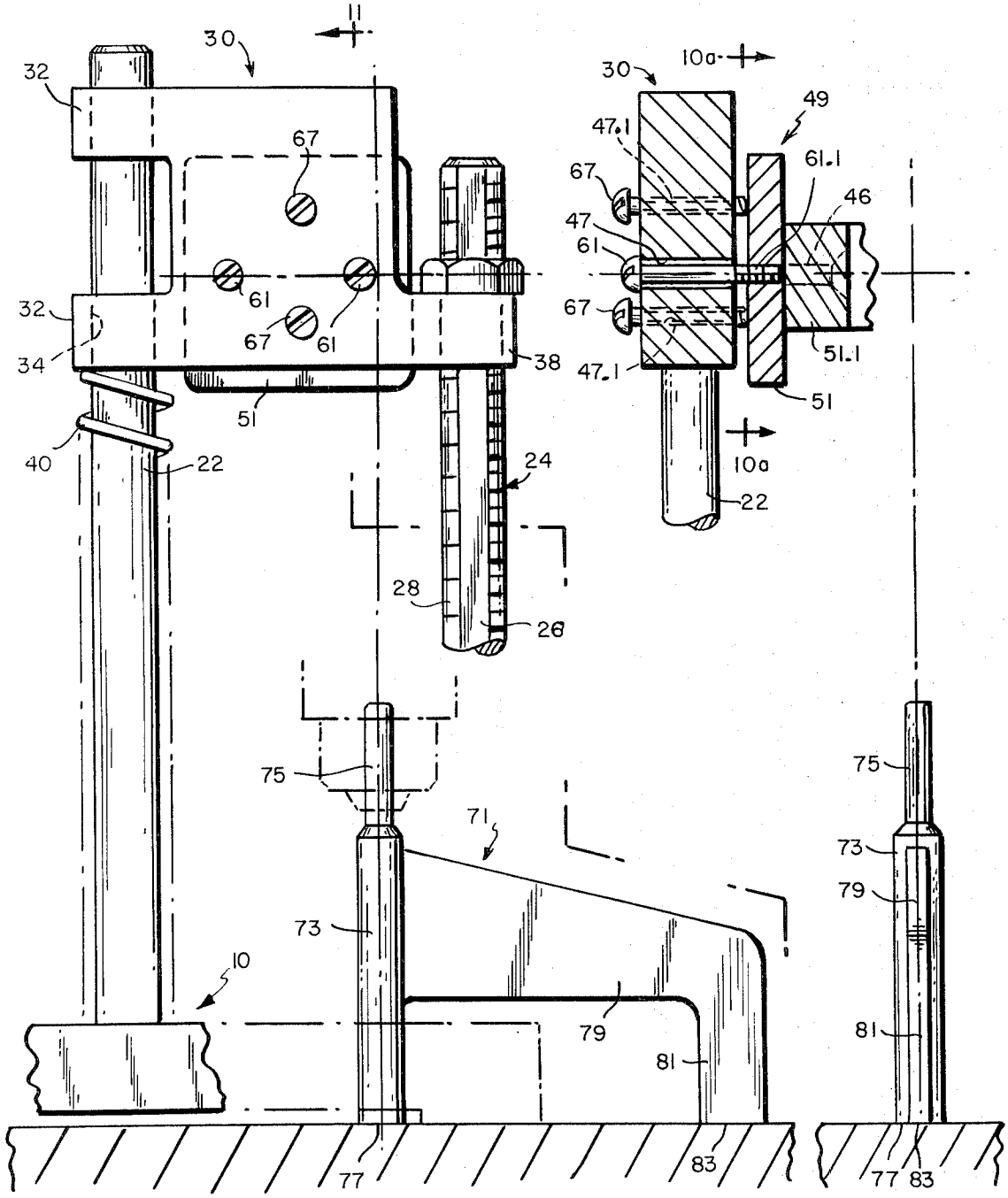


FIG. 10

FIG. 11

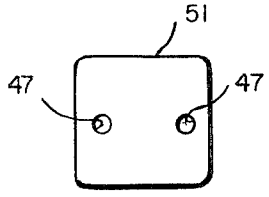


FIG. 10a

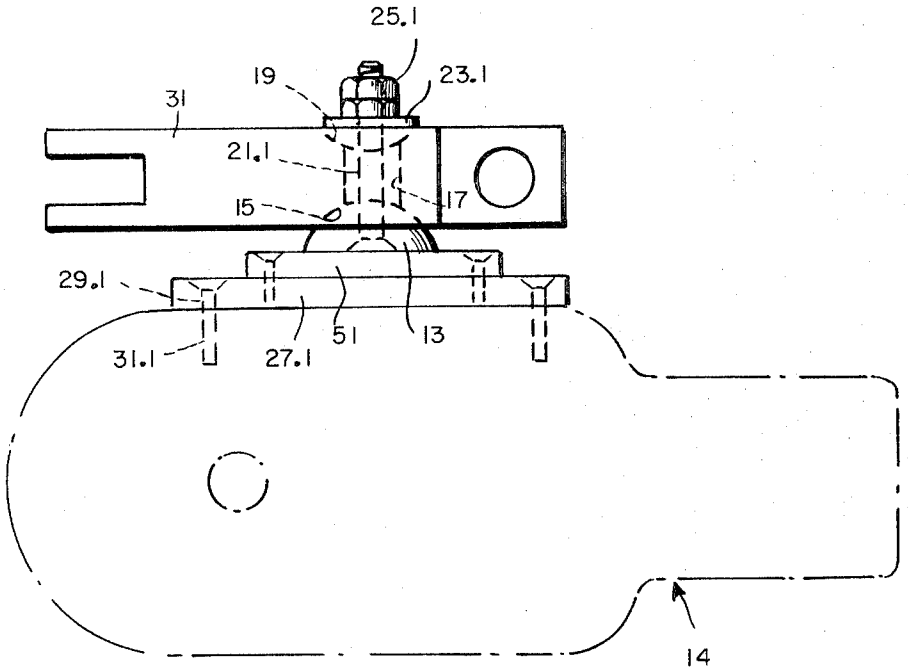


FIG.12

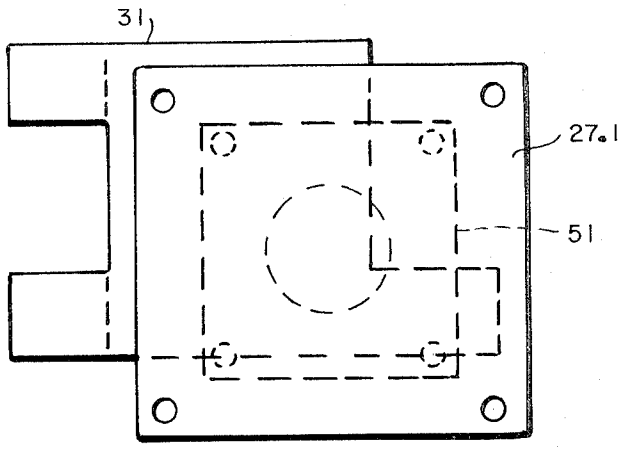


FIG.13

DRILL GUIDE

BACKGROUND OF THE INVENTION

Drill guides for supporting and steadying a power drill for drilling workpieces are numerous in the art as illustrated in such U.S. Pat. Nos. as Pugsley, 2,997,900, Halbreich, 1,316,027 and 1,316,028, Shulters, 2,883,891, Daniels, 2,831,376, Jepson, 2,909,085 and 2,680,435, and others.

The drill guide of this invention while embodying in general the structural make-up of the drill guides disclosed in the aforesaid patents is designed to enable accurately disposing the drill with the axis of the bit at a predetermined angle with respect to the work, remove the drill from the guide for use independently thereof and replace it in said predetermined position without readjustment; to enable accurate alignment of the axis of the drill with intersecting center lines drawn on the work at the intersection of which a hole is to be drilled; and to enable using the drill guide at times as a drill press.

SUMMARY

The drill guide of this invention comprises a base, a carriage, means mounting the carriage on the base for movement toward and from the base, said carriage being removable from said mounting means, a coupling mounted on the carriage for movement therewith to which a power drill together with a drill bit is adapted to be secured, and spring means yieldably supporting the carriage above the base for downward movement toward the base, said coupling being characterized in that it is adjustable on the carriage to dispose the drill in a predetermined position with the axis of the drill bit disposed at a predetermined angle to the base such that after such adjustment the carriage may be removed from the mounting means to enable using the drill independently of the supporting base and replaced without having to make readjustment to restore the drill bit to said predetermined position. The means supporting the carriage on the base comprises a post fixed in an upright position to the base and the means for yieldably supporting the carriage above the base is a coiled spring disposed on the post between the carriage and the base. There is a second post secured in an upright position to the base with which the carriage is slidably engaged and there is on the second post means for limiting the downward movement of the carriage on the base and means for limiting upward movement thereof. The coupling means may comprise a universal joint; for example, a ball and socket connection. Optionally, the coupling is comprised of horizontally aligned screws extending through the carriage and threaded into the coupling and vertically aligned screws threaded through the carriage above and below the horizontally aligned screws and abutting the coupling. The posts are fixed to the base along one side and the coupling supports the drill between the posts with respect to the front and back of the base and substantially midway between the sides thereof so as to be substantially centered on the base. The base contains an opening below the bit which affords access of the drill bit to the work, affords the operator a clear view of the workpiece, hole locating lines, gauge lines, facilitating matching of the hole locating lines with the gauge lines. A gauge plate is mounted on the base below the opening on which there are intersecting gauge lines adapted to be adjusted to align the intersection of said lines with the axis of the drill bit. To avoid parallax the gauge lines extend down to the surface of the work. A platen corresponding in configuration to the opening in the base is hingedly supported in the opening, in which position its surface is flush with the surface of the base and for movement from said opening to a folded back position in which it rests on the base rearwardly of the opening. The platen when disposed in the opening adapts the drill guide to use a drill press.

The invention will now be described in greater detail with reference to the accompanying drawings wherein:

FIG. **1** is a perspective view of the drill guide as used for drilling holes in workpieces upon which it is positioned showing a power drill and bit mounted thereon in dot and dash lines;

FIG. **2** is a perspective view of the base of the drill guide showing the base converted to use as a drill press;

FIG. **3** is a perspective view similar to FIG. **2**, showing the posts which mount the carriage for the power drill disposed transversely of the base rather than longitudinally thereof;

FIG. **4** is a plan view of one form of gauge plate;

FIG. **5** is an alternative form of gauge plate;

FIG. **6** is still another form of gauge plate;

FIG. **7** is a section taken longitudinally of FIG. **1** on the line **7—7** of FIG. **1**, showing the base of the drill guide with the platen folded back so as to enable its use as a drill guide;

FIG. **8** is a corresponding view showing the platen folded forwardly for use of the drill guide as a drill press;

FIG. **9** is a plan view of FIG. **7**;

FIG. **10** is an elevation, to somewhat larger scale, taken at the left side of FIG. **1**, showing one form of coupling to dispose the axis of the drill perpendicular to the base and to the work support;

FIG. **10***a* is an elevation of the coupling taken on the line **10***a*—**10***a* of FIG. **11**;

FIG. **11** is a view partly in section and partly in elevation taken on the line **11—11** of FIG. **10**;

FIG. **12** is a plan view of a ball and socket coupling; and

FIG. **13** is an elevation of the ball and socket coupling shown in FIG. **12**.

Referring to the drawings (FIG. **1**) the drill guide comprises a substantially rectangular base **10** along one side of which are mounted two posts **22** and **24**, a carriage **30** mounted on the posts for movement to and from the base and a coupling **49** adjustably attached to the carriage for securing a power-driven drill **14** together with a drill bit **15** mounted in the chuck of the drill.

The post **22** is of circular cross-section and its lower end is set into a hole **25** (FIG. **7**) drilled into the base and secured therein, for example, by a set screw **29**. The post **24** is of non-circular cross-section having diametrically disposed flat surfaces **26—26** which are parallel to the sides of the base and arcuate portions **28—28** which are threaded. The lower end of the post **24** is screwed into a threaded hole **27** in the base. The posts **22** and **24** are parallel to each other and to the sides of the base and the one constitutes a support for the carriage and the other a guide and means for limit-

ing the downward movement of the carriage toward the base and the upward movement of the carriage from the base. The aforesaid means comprises a pair of nuts **44** threaded onto the post **24** below the carriage and a nut **42** threaded onto the post above the carriage. The post **24** may, if desired, be of circular cross-section.

The carriage **30** (FIGS. **1, 10** and **11**) comprises a block **31** having at one end vertically spaced arms **32—32** containing aligned openings **34—34** for slidably receiving the post **22** and at its other end a bifurcate **36** comprising spaced tines **38—38** adapted to slidingly receive the post **24.** A coiled spring **40** mounted on the post **22** between the base and the carriage yieldably supports the carriage at the upper ends of the posts against the stop **42,** permitting the carriage to be moved downwardly by application of pressure to the power drill attached to it.

The adjustable coupling **49** for attaching the drill to the carriage block **31** is designed to support the power drill in a position with the axis of the drill chuck and the bit mounted therein substantially midway between the posts **22** and **24** and substantially midway between the opposite sides of the base so that the drill bit is substantially centered on the base and so that downward pressure applied to the drill in use will not tend to overturn the drill guide. Additionally the coupling is designed to enable disposing the drill with the axis of the drill bit at a predetermined angle to the base and to the work on which the base rests independently of any lack of precision in the manufacture of the drill guide, the drill and/or the drill bit so as to enable manufacture without maintaining high precision which would increase the cost of the device and further to enable removing the power drill together with the coupling and the carriage from the post and using it independently of the drill guide for conventional drilling operations and then replacing it on the post for use in combination as a drill guide without having to make readjustments to restore it to the predetermined position of adjustment initially made. To insure this usage of the power drill independently of the drill guide the carriage and coupling are made as small as feasible and mounted to the housing of the drill at the outer side with respect to the normal use of the drill so as not to interfere with drilling operations.

To enable disposing the drill at the aforesaid predetermined position the adjustable coupling **49** is designed to enable making adjustments universally and in one form the adjustable coupling comprises, as shown in FIGS. **1, 10** and **11,** an attaching plate **51** adapted to be adjustably connected to the carriage block **31.** The plate **51** has fastened to it by screws **46** an adapter **51.1** designed to extend around the housing of the drill and contains holes **51.2** for receiving bolts by means of which the drill may be fastened to the adapter. The carriage block **31** is provided with a pair of transversely spaced oversized smooth bore holes **47—47** for receiving bolts **61—61** and the plate **51** is provided with correspondingly spaced threaded holes **61.1—61.1** for receiving the threaded ends of the bolts **61—61.** The carriage block contains also a pair of vertically spaced threaded holes **47.1—47.1** through which screw bolts **67—67** are threaded to engage the inner ends of the bolts with the plate **51.** The oversized holes **47—47** through which the bolts **61** extend permit the plate **51** to be rotated about a horizontal axis and to be fixed at any desired position by tightening of the screw bolts **61—61** and the screw bolts **67—67** provide for rocking the plate **51** about a horizontal axis parallel to the carriage. Thus the structure provides for substantial universal adjustment of the axis of the drill and/or the drill bit relative to the base.

Alternatively, the adjustable coupling may comprise ball and socket means, as shown in FIGS. **12** and **13,** wherein the coupling plate **51** has at one side a hemispherical protrusion **13** for engagement with a hemispherical recess **15** provided on the inner side of the carriage block **31.** An oversized hole **17** is drilled from the inner side of the carriage block through the bottom of the hemispherical recess to the outer side, the outer end of which is counterbored to provide a hemispherical recess **19.** A bolt **21.1** is mounted through the oversized hole **17** with a spherical washer **23.1** at its outer end and a pair of nuts **25.1** are screwed onto the bolt against the washer. A flat plate **27.1** is fastened to the plate **51** and the plate **27.1** is provided with openings **29.1** for receiving bolts **31.1** for fastening the drill housing to the plate **27.1.** It is apparent that this construction enables adjusting the drill universally to dispose the axis of the chuck and/or the axis of the drill bit at any desired predetermined angle to the base and to the work on which the base rests.

The hook **51.1** and flat plate **27.1** are illustrative of only two possible forms of adapter for attaching a power drill to the coupling plate **51,** — it being considered as within the scope of the invention to design the configuration of the adapter plate according to the make of the power drill.

As previously related, the carriage **30** and the coupling plate **51** support the drill substantially centered between the posts **22** and **24** and substantially centered with respect to the opposite sides of the base to insure stability. To provide for engaging the drill bit with the work on which the base is positioned the base is provided with an opening **20** (FIGS. **1** and **9**) from the forward side of substantially rectangular configuration which extends from the front side to a place rearwardly of the axis of the drill bit and has spaced parallel inner sides **49—49** parallel to the sides and a transversely extending inner end **51.1** parallel to the ends of the base. This opening **20** provides the operator with a clear view of the work, of the locating lines on the workpiece and the gauge marks on the gauge plate and the mating of these to each other and in addition provides for the reception of a gauge plate **53** which is designed to enable aligning the axis of the drill bit with locating lines drawn on the workpiece marking the point thereon which is to be drilled. For receiving the gauge plate **53** the base has at its underside an upwardly extending recess **21** in which the gauge plate is mounted and secured by bolts **58.** The gauge plate in one form, as shown in FIG. **4,** comprises a flat plate **50** having along one side a straight edge **60** and a deviating edge **64** beveled at **65.** The straight edge **60** constitutes one gauge line and a mark **66** on the beveled edge on a line perpendicular to the straight edge **60** constitutes the other gauge line. The plate **50** contains spaced parallel slots **56—56** through which the screw bolts **58—58** are inserted for attachment to the base and these slots are oversized so that the gauge plate can be adjusted forwardly and rearwardly, from side to side and angularly about a perpendicular axis.

The gauge plate may take other forms, as shown in FIGS. **5** and **6.** For example, the gauge plate in FIG. **5**

comprises a flat plate **52** having along one side a straight edge **60**, deviating edges **72—72** and a hole **75**. The straight edges **72—72** intersect to form a point **73** which provides an index mark situated on a line perpendicular to the edge **60**.

The gauge plate shown in FIG. **6** comprises a flat plate **54** having a straight edge **60**, deviating edges **72—72** intersecting at a point **73**, and a hole **75**.

To enable adjusting the drill to dispose the axis of the chuck and/or bit at an angle perpendicular to the base, there is provided, as shown in FIGS. **10** and **11**, a jig **71** comprising a spindle **73** provided with a shank **75** at its upper end of such size as to fit into the drill chuck and at its lower end with a bearing surface **77**. An arm **79** is connected at one end to the spindle **73** and has at its other end a leg **81** which is radially spaced from and parallel to the spindle and at its lower end a bearing surface **83** lying in the same plane as the surface **77**. The spindle axis and the plane of the surfaces **77** and **83** are at right angles. The power drill is fastened by means of the coupling to the carriage, the jig is mounted in the drill chuck and then the coupling is loosened whereupon the power drill is pushed down to engage the jig surfaces **77, 83** with the workpiece and then the jig is rotated through 180° about the axis of the spindle while maintaining the surfaces **77, 83** continuously in contact with the work. As the jig is rotated the coupling is progressively tightened to maintain the power drill in the perpendicularity imposed by the jig until the finalized position is obtained whereupon the coupling is clamped tight to lock the power tool in place. When the drill has been fixed in its perpendicular position the gauge plate **53**, shown in FIG. **4**, may then be moved into engagement with the spindle **73** and fixed in place which will automatically align the intersection of the gauge marks **60** and **66** with the axis of the spindle **73** and hence of the drill bit when the latter is placed in the chuck. When using the guage plates shown in FIGS. **5** and **6** the gauge plate is moved to a position to permit the lower end of the spindle **73** to enter the hole **75** which automatically positions the gauge plate. To position the axis of the drill at angles other than perpendicular to the work a protractor may be employed.

At times especially for small workpieces it may be desirable to use the drill guide as a drill press and so there is provided a platen **76** (FIGS. **1, 2** and **3**) which corresponds in configuration to the opening **20** mounted in the opening by means of a hinge **78** recessed into the upper surface of the platen and the base so that the upper surface of the platen and base are uniformly flat. A ledge **49.1** along one side of the opening **20** and the forwardly extending portion of the base at the other side provide for supporting the platen at the desired level. The platen **76** can be tilted upwardly and rearwardly from the opening onto the surface of the base rearwardly thereof when the device is being used solely as a drill guide. When the device is to be used as a drill press the platen is tilted forwardly into the opening and to permit the drill to pass through the work an oversized hole **80** is provided in the platen through which the drill can pass. The platen may be removably mounted in the opening.

The posts **22** and **24**, as shown in FIGS. **1** and **2**, are supported along one side of the base; however, it is within the scope of the invention to mount the posts at opposite sides of the base, as shown in FIG. **3**, with the post **22** at the left front side and the post **24** at the right front side. When constructed in this fashion the opening **20** is situated between the posts.

There is optionally provided at the rear end of the base an opening or recess **82** of substantially rectangular configuration, across the open top of which is hinged a cover **84**. This recess is designed to provide a receptacle for extra drill bits, a chuck key, pencils, and the like.

To prevent sliding of the base on the workpiece during the drilling operation friction pads **23** are secured to the lower side of the base at the four corners.

It should be understood that the present disclosure is for the purpose of illustration only and that this invention includes all modifications and equivalents falling within the scope of the appended claims.

I claim:

1. A portable drill guide comprising a base, a carriage, means mounting the carriage on the base for movement toward and from the base, said carriage being removable from said mounting means, a coupling mounted on the carriage for movement therewith to which a power drill together with a drill bit is adapted to be secured, and spring means yieldably supporting the carriage above the base for downward movement toward the base, said coupling being characterized in that it is adjustable on the carriage to dispose the drill in a predetermined position with the axis of the drill bit disposed in a predetermined angle to the base such that after said adjustment has been made the carriage may be removed from the mounting means to enable using the drill independently of the supporting base and replaced without having to make a readjustment to restore the drill to said predetermined position and predetermined angle.

2. Apparatus according to claim **1**, wherein the carriage and coupling is adapted to be attached to the drill housing in a position such as not to interfere with the normal use of the drill when removed from the base.

3. A portable drill guide comprising a base, a post fixed to the base in an upright position, a carriage mounted on the post for movement thereon to and from the base, said carriage being removable from the post, a coupling mounted on the carriage for movement therewith to which a power drill together with a drill bit is adapted to be secured, and spring means disposed on the post between the base and the carriage for yieldably supporting the carriage above the base for downward movement toward the base, said coupling being characterized in that it is adjustable on the carriage to dispose the drill in a predetermined position with the drill bit disposed at a predetermined angle to the base, and such that after said adjustment has been made the carriage may be removed from the post to enable using the drill independently of the base and replaced without having to make a readjustment to restore the drill to said predetermined position and angle.

4. Apparatus according to claim **3**, comprising means for limiting upward movement of the carriage.

5. Apparatus according to claim **3**, comprising means for limiting downward movement of the carriage.

6. Apparatus according to claim **3**, comprising a second post fixed to the base in an upright position spaced forwardly and parallel to the first post and means on the carriage slidingly engaged with the second post.

7. Apparatus according to claim 6, wherein the second post is spaced forwardly of the axis of the drill bit.

8. Apparatus according to claim 6, wherein the coupling supports the drill substantially midway between the posts with respect to the front and rear ends of the base and substantially midway between the sides of the base.

9. Apparatus according to claim 3, comprising a second post fixed to the base in an upright position spaced transversely of and parallel to the first post, and means on the carriage slidingly engaged with the second post.

10. Apparatus according to claim 1, wherein the coupling comprises a universal joint.

11. Apparatus according to claim 1, characterized in that the coupling comprises a ball and socket joint.

12. Apparatus according to claim 1, wherein the carriage contains pairs of horizontally spaced smooth bore holes and pairs of vertically spaced threaded holes, and wherein two horizontally aligned screws extend through the smooth bored holes of the carriage and are threaded into the coupling and two vertically aligned screws are mounted in the threaded holes in the carriage above and below the horizontally aligned holes and abut the coupling.

13. Apparatus according to claim 5, wherein the carriage has vertically disposed, spaced parallel openings slidably engaged with the first post and a bifurcate slidably engaged with the second post.

14. Apparatus according to claim 6, wherein the first post is of circular cross-section and the second post is of non-circular cross-section and having screw-threaded portions for nut stops.

15. Apparatus according to claim 6, wherein the posts are fixed to the base along one side, the coupling supports the drill between the posts with respect to the front and back disposition of the drill and substantially midway between the sides with respect to the side-to-side disposition of the drill and the base contains an opening below the bit which affords access of the bit to the work, a clear view of the locating lines on the workpiece and the gauge lines on the base.

16. Apparatus according to claim 15, wherein the opening extends rearwardly from the front end of the base to the rear side of the axis of the bit.

17. A portable drill guide comprising a base, a post fixed to the base in an upright position, a carriage mounted on the post for movement thereon to and from the base, a coupling mounted on the carriage for movement therewith to which a power drill together with a bit are adapted to be secured, said coupling supporting the drill forwardly and laterally of the post so as to be substantially centered on the base, and said coupling being adjustable to dispose the drill with the axis of the bit at a predetermined angle to the base, spring means on the post between the base and the carriage for yieldably supporting the carriage above the base, said base containing an opening below the bit which extends from the front of the base to behind the bit, and a gauge plate mounted on the base below the opening on which there are intersecting gauge lines.

18. A portable drill guide according to claim 17, wherein said gauge plate is adapted to be adjusted to align the intersection of said intersecting gauge lines with the axis of the bit.

19. Apparatus according to claim 17, wherein the gauge plate contains slots through which screw bolts are received and threaded into the base, and said slots are oversized so that the gauge plate is adjustable in a plane parallel to the plane of the base, forwardly and rearwardly, from side-to-side and angularly about a perpendicular axis.

20. Apparatus according to claim 17, wherein the gauge lines comprise edges of the gauge plate, one of which has on it a gauge mark situated on a line which intersects the edge of the other at right angles.

21. Apparatus according to claim 20, wherein the gauge marks and edges are located so as to extend to the bottom surface of the base adjacent the surface of the workpiece.

22. Apparatus according to claim 17, wherein a platen corresponding in configuration to the opening in the base is hingedly supported in the opening, in which position its surface is flush with the surface of the base, and for movement from said opening to a folded back position in which the surface rests on the base rearwardly away from the opening.

23. Apparatus according to claim 17, wherein a platen corresponding in configuration to the opening in the base is removably supported in the opening.

24. A drill guide according to claim 22, wherein the platen contains a clearance hole, the center of which is in substantial alignment with the vertical axis of the bit.

25. Apparatus according to claim 22, wherein there are shoulders along the inner opposite sides of said opening and the platen is adapted to rest on said shoulders when occupying said opening.

26. Apparatus according to claim 1, wherein there are traction pads secured to the underside of the base.

27. The combination with a drill guide according to claim 15, of an aligning device adapted to be inserted into the chuck of a drill, said aligning device comprising a post adapted to be lowered into engagement with the work and a radially extending arm extending from the post having an end coextensive with the lower end of the post, said device being rotatable in the chuck and by continuous engagement of the post and the extension with the work operable to dispose the drill with the axis of the chuck perpendicular to the work and as an aid to adjusting the gauge plate so that the gauge lines intersect the axis of the aligning device.

28. Apparatus according to claim 1, wherein the base contains a compartment provided with a hinged cover.

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