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Inventor(s)	Henry; Samuel D.

Self-Centering Ruler Arrangement for Tool

Abstract

A drill jig system for guiding a drill for forming mounting holes in a workpiece is provided. The system may have a guide for locating the system relative to a workpiece. The guide and an arm to which is mounted may have a mating cross-sectional configuration to center the guide relative to the arm. Centering attachments may be provided for properly spacing a pair of drill guides of the system to correspond to the spacing between mounting apertures of a corresponding handle to be mounted to the workpiece.

Inventors: **Henry; Samuel D. (Elgin, IL)**

Applicant: **Henry; Samuel D.** (Elgin, IL)

Family ID: **1000008489141**

Assignee: **BAM IP Holding LLC (Saint Charles, IL)**

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Background/Summary

CROSS-REFERENCE TO RELATED PATENT APPLICATIONS [0001] This Patent Application claims the benefit of U.S. Provisional Patent Application No. 63/554,333, filed Feb. 16, 2024, the entire teachings and disclosure of which are incorporated herein by reference thereto.

FIELD OF THE INVENTION
[0002] This invention generally relates to tools for assisting in drilling holes in workpieces, such as cabinet doors and drawers for the installation of handles, knobs, hinges, and other cabinet components.
BACKGROUND OF THE INVENTION
[0003] It is important to be able to properly align mounting holes for securing handles, knobs, pulls or other drawer and cabinet hardware relative to the respective the workpiece. This can include properly positioning the holes relative to the workpiece as well as properly positioning one mounting hole relative to another mounting hole such as for a component that requires at least two mounting holes for securing it to the workpiece.
[0004] Further, it is desirable to be able to repeatably and quickly locate the holes relative to the door or drawer front when moving from one door to another or from one drawer front to another. Thus, drill guides are used to align and guide a drill bit when drilling the mounting holes within the workpiece, e.g. into the door of a cabinet or the front of a drawer to provide the quick and accurate repeatability.
[0005] The present disclosure provides improvements in such a drill guide system.
BRIEF SUMMARY OF THE INVENTION
[0006] New and improved drill jig systems are provided for guiding a drill bit.
[0007] In an example, an adjustable drill jig system for guiding a drill to drill holes in a workpiece is provided. The workpiece may have a top edge and a first workpiece face. The system includes a T-shaped member, a first guide, and a locking element. The T-shaped member has a first arm defining a first axis and a second arm defining a second axis. The first arm is attached to the second arm in a generally perpendicular orientation with the first and second axes generally perpendicular to one another. The first arm has opposed first and second sides extending generally parallel to the first axis. The first arm has a first face that is generally parallel to the workpiece in use. The first side is a first tapered surface extending at a non-perpendicular first angle to the first face. The first guide has a mounting channel receiving the first arm therein. The mounting channel has opposed first and second channel walls and a third channel wall between the first and second channel walls. The first channel wall extends at the first angle relative to third channel wall defining an undercut region therebetween. When assembled, the first channel wall is adjacent the first side of the first arm with the first side extending into the undercut region, the second channel wall is adjacent the second side, and the third channel wall is adjacent the first face. The locking element is mounted to the first guide for applying a biasing force to the second side of the first arm to bias the first side of the first arm into abutment with the first channel wall and into the undercut region to secure the first guide at an axial position along the first axis. The biasing force is applied along a biasing force axis that is non-perpendicular to the first side and the first channel wall such that the biasing force biases the first face towards the third channel wall by way of the abutment between the first side of the first arm and the first channel wall.
[0008] In one example, at least one drill guide is mounted to the second arm. The drill guide has a drill guide bore extending therethrough along a drill guide bore axis that is generally perpendicular to the first and second axes and generally perpendicular to the first workpiece face of the workpiece in use. The drill guide is adjustably positionable relative to the second arm along the second axis.
[0009] In one example, the first guide has a first workpiece locating abutment engageable with the

first edge of the workpiece for locating the T-shaped member relative to the workpiece. The first workpiece locating abutment is generally orthogonal to the first axis.
[0010] In one example, the locking element is a threaded member threadedly attached to the first guide.
[0011] In one example, the locking element is selected from the group consisting of a spring biased pin, a latch, or a buckle.
[0012] In one example, the first angle is between about 30 and 75 degrees.
[0013] In one example, the third channel wall extends entirely between the first and second channel walls.
[0014] In one example, the biasing force biases the first face into the third channel wall.
[0015] In one example, the mounting channel has a fourth channel wall opposite the third channel wall. The fourth channel wall extends between the first and second channel walls. The mounting channel may be an aperture formed through the first guide
[0016] In one example, the second channel wall is generally orthogonal to the third channel wall and the second side of the first arm is generally orthogonal to the first face.
[0017] In an example, an adjustable drill jig system for guiding a drill to drill at least two holes in a workpiece at a predetermined spacing is provided. The workpiece has a top edge and a first workpiece face. The system includes a T-shaped member having a first arm defining a first axis and a second arm defining a second axis. The first arm is attached to the second arm in a generally perpendicular orientation with the first and second axes generally perpendicular to one another. A first guide is adjustably mounted to the first arm for adjusting a position of the first guide along the first axis. A first drill guide is mounted to the second arm. The first drill guide has a first drill guide bore defining a first guide bore axis that is generally perpendicular to the first and second axes and orthogonal to the first workpiece face in use. A second drill guide is mounted to the second arm. The second drill guide has a second drill guide bore defining a second guide bore axis that is generally perpendicular to the first and second axes, orthogonal to the first workpiece face in use, and parallel to the first guide bore axis. A first centering attachment has a first attachment body and a first centering pin defining a first pin axis. The first attachment body is configured to operably attach to the first drill guide with the first pin axis coaxial with the first guide bore axis. A second centering attachment has a second attachment body and a second centering pin defining a second pin axis. The second attachment body is configured to operably attach to the second drill guide with the second pin axis coaxial with the second guide bore axis. The first and second drill guides are mounted to the second arm such that a spacing between the first and second guide bore axes is adjustable.
[0018] In one example, the first and second centering pins are cone shaped.
[0019] In one example, the first attachment body is in the form of a clip and is C-shaped. The attachment body includes a pair of spaced apart legs that removably clip to the first drill guide.
[0020] In one example, the first attachment body includes a first locating pin that is insertable into the first drill guide bore to align the first pin axis with the first guide bore axis when attached to the first drill guide.
[0021] In one example, the first attachment body includes a base member. The first centering pin extends from the base member in a first direction. The first locating pin extends from the base member in a second opposite direction.
[0022] In one example, the first attachment body includes a pair of spaced apart legs configured to clip the first attachment body to the first drill guide with the first locating pin inserted into the first drill guide bore. The spaced apart legs extend form the base member in the second direction with the first locating pin positioned laterally between the pair of spaced apart legs.
[0023] In one example, the first drill guide is moveable relative to the second arm.
[0024] In one example, the first drill guide bore has a first inner diameter perpendicular to the first guide bore axis. The first centering pin has a first maximum outer diameter perpendicular to the

first pin axis. The first maximum outer diameter is equal to or greater than the first inner diameter. As used herein a “diameter” need not be for a round object and could be the maximum dimension for an object that is polygonal in cross-section.
[0025] In one example, a locking member releasably fixes the position of the first drill guide to the second arm.
[0026] In an example, a method of adjusting the spacing between first and second drill guides of a drill jig system is provided. The method adjusts the spacing to correspond to a handle mounting spacing between first and second mounting apertures of a handle to be attached to the workpiece. The method includes:
[0027] aligning the first pin axis with the first guide bore axis;
[0028] aligning the second pin axis with the second guide bore axis;
[0029] inserting the first centering pin into the first mounting aperture of the handle;
[0030] adjusting the spacing between the first and second drill guides along the second axis and inserting the second centering pin into the second mounting aperture of the handle;
[0031] fixing the position of the first drill guide relative to the second drill guide to fix the spacing between the first and second drill guide axes to correspond to the handle mounting spacing.
[0032] In one example, the step of fixing the position of the first drill guide relative to the second drill guide includes fixing the position of the first drill guide relative to the second arm.
[0033] In one example, the first and second drill guides are moveable relative to the second arm. The method includes aligning a center of the handle between the first and second mounting apertures with a center of the first leg through which the first axis extends.
[0034] In an example, a centering attachment for use with a drill guide having a drill guide bore defining a guide bore axis is provided. The centering attachment includes an attachment body and a first centering pin defining a pin axis. The attachment body is configured to operably attach to the first drill guide with the pin axis coaxial with the guide bore axis.
[0035] In one example, the centering pin is cone shaped.
[0036] In one example, the attachment body is in the form of a clip and is C-shaped. The attachment body includes a pair of spaced apart legs that are configured to removably clip to the drill guide.
[0037] In one example, the attachment body includes a locating pin that is insertable into the drill guide bore to align the pin axis with the guide bore axis when attached to the drill guide.
[0038] In one example, the attachment body includes a base member. The first centering pin extends from the base member in a first direction. The first locating pin extends from the base member in a second opposite direction.
[0039] In one example, the attachment body includes a pair of spaced apart legs configured to clip the attachment body to the drill guide with the locating pin inserted into the drill guide bore. The spaced apart legs extend form the base member in the second direction with the locating pin positioned laterally between the pair of spaced apart legs.
[0040] In one example, the centering pin has a first maximum outer diameter perpendicular to the pin axis. The locating pin has a second maximum outer diameter perpendicular to the pin axis. The first maximum outer diameter is greater than the maximum outer diameter.
[0041] Other aspects, objectives and advantages of the invention will become more apparent from the following detailed description when taken in conjunction with the accompanying drawings.

Description

BRIEF DESCRIPTION OF THE DRAWINGS
[0042] The accompanying drawings incorporated in and forming a part of the specification illustrate several aspects of the present invention and, together with the description, serve to explain

the principles of the invention. In the drawings:
[0043] FIG. **1** is a perspective illustration of an adjustable drill jig system mounted to a workpiece for drilling mounting holes into the workpiece;
[0044] FIG. **2** is a workpiece having a component such as handle mounted thereto;
[0045] FIG. **3** is a cross-sectional illustration of the handle positioned adjacent the workpiece;
[0046] FIG. **4** is a partial perspective illustration of the system of FIG. **1**;
[0047] FIG. **5** is a plan view illustration of the system of FIG. **1**;
[0048] FIG. **6** is an exploded illustration of a first guide and an arm of the system of FIG. **1**;
[0049] FIG. **7** is an exploded illustration of the system of FIG. **1**;
[0050] FIG. **8** is an exploded end view of a first arm and the first guide of the system of FIG. **1**;
[0051] FIG. **9** is an assembled end view of the first arm and first guide of the system of FIG. **1**;
[0052] FIG. **10** is a further partial exploded illustration of the system of FIG. **1**;
[0053] FIG. **11** is a partial portion of system of FIG. **1** to a workpiece incorporating centering attachments;
[0054] FIG. **12** illustrates the system of FIG. **11** in use with a handle;
[0055] FIG. **13** is an exploded cross-sectional illustration of the system of FIG. **11** incorporating centering attachments and a corresponding handle;
[0056] FIG. **14** is a cross-sectional illustration of the system of FIG. **11** after using a handle with the centering attachments to properly space the drill guides thereof; and
[0057] FIG. **15** is a cross-sectional illustration of the system of FIG. **11** prior to using the handle with the centering attachments to properly space the drill guides thereof.
[0058] While the invention will be described in connection with certain preferred embodiments, there is no intent to limit it to those embodiments. On the contrary, the intent is to cover all alternatives, modifications and equivalents as included within the spirit and scope of the invention as defined by the appended claims.

DETAILED DESCRIPTION OF THE INVENTION

[0059] FIG. **1** illustrates an adjustable drill jig system **100** mounted to a workpiece **102**. The workpiece **102** is in the form of a drawer that has a drawer front **104**. The system **100** may be used for forming holes **106** in the drawer front **104** for mounting a handle or pull **108** to the workpiece **102** (see e.g. FIGS. **2** and **3**).
[0060] The system **100** can be used for locating the holes **106** at a desired location on the workpiece **102**, such as centered along with width W of the drawer front **104** and at a desired vertical height H, such as relative to the top side **110**.
[0061] FIG. **5** illustrates the system **100** removed from the workpiece **102**.
[0062] The system **100** generally includes a T-shaped member **112**, a first guide **114**, an extension arrangement **116**, a second guide **118** and at least one drill guide **119** (two being illustrated).
[0063] The first guide **114** may be used for locating the system **100** along a first axis **120** (e.g. vertically or relative to a top or bottom edge) relative to the workpiece **102** while the second guide **118** may be used for locating the system **100** along a second axis **122** (e.g. horizontally or relative to a vertically oriented edge) relative to the workpiece **102**. In general, the first and second guides **114**, **118** are generally used for locating the system **100** along first and second axes **120**, **122** that are perpendicular to one another.
[0064] The first guide **114** has a first workpiece locating abutment **128** (also referred to as first abutment **128**) for locating against an edge, e.g. top or bottom edge **130**, **132** of the workpiece **102** for positioning the system **100** relative to axis **120**. The second guide **118** includes a second workpiece locating abutment **134** (also referred to as second abutment **134**) for locating against an edge, e.g. vertical edge **136**, **138** of the workpiece **102** for positioning the system **100** relative to axis **122**.
[0065] The drill guides **119** can be adjustably positioned within system **100**. For example, the spacing S between the drill guides **119** can be adjusted to adjust the spacing between holes to be

drilled into the workpiece **102**.
[0066] The T-shaped member **112** includes a first arm **140** that generally aligns with first axis **120** and a second arm **142** that generally aligns with the second axis **122** and is attached to the first arm **140** in a generally perpendicular orientation. In the illustrated example, the screws **143** (FIG. **4**) secure the first arm **140** to the second arm **142**. However, in other examples, the first and second arms could be formed from a single continuous piece of material. Such a one piece component would still be considered to have the first arm **140** attached to the second arm **142**.
[0067] The T-shaped member **112** generally has a rear face **139** that faces the workpiece in use and a front face **141** that faces away from the workpiece in use.
[0068] In this example, the first and second arms **140**, **142** are in the form of rulers. Thus, the front face **141** includes a plurality of measurement indicia printed thereon and/or formed therein for assisting the user in properly establishing spacing S of the drill guides **119** as well as locating the drill guides **119** relative to the workpiece **102**.
[0069] The first guide **114** is axially moveable along first arm **140** parallel to first axis **120**.
[0070] The first guide **114** includes a first workpiece locating abutment **146** that provides first abutment **128** that is attached to a mounting body **148**. The mounting body provides a mounting channel **150**. The mounting channel **150** receives the first arm **114**. The mounting body **148** is slidable along the first arm **114** to adjust the position of the first guide **114** and particularly first abutment **128** parallel to first axis **120**.
[0071] The mounting body **148** has opposed first and second channel walls **152**, **154**, a third channel wall extending generally between the first and second channel walls **152**, **154**, and an optional fourth channel wall **157** spaced apart from the third channel wall **156** and extending generally between the first and second channel walls **152**, **154**.
[0072] In this example, the third channel wall **156** is formed by a pair of laterally spaced apart wall segments with a lateral gap **158** formed therebetween. However, in other examples, the third channel wall may extend continuously between the first and second channel walls **152**, **154**.
[0073] In this example, the fourth channel wall **157** is a single wall portion extending between the first and second channel walls **152**, **154** but could be formed from separate wall segments similar to the third channel wall **156**. While not required, in this example, the third and fourth channel walls are parallel to one another and orthogonal to the second channel wall **154**.
[0074] The first channel wall **152** extends at a non-parallel, non-perpendicular first angle α**1** relative to the third channel wall **156**. Due to the first angle α**1** orientation, the first channel wall **152** and third channel wall **156** define an undercut region **160**.
[0075] First angle α**1** is preferably between about 30 and 75 degrees, more preferably between about 35 and 45 degrees and even more preferably approximately 40 degrees.
[0076] In this example, the second channel wall **154** is generally orthogonal to the third channel wall **156**. However, it need not be orthogonal in all examples.
[0077] In this example, a fourth channel wall **157** extends between the first and second channel walls **152**, **154**, but not all embodiments require this fourth channel wall **157**. In this example, the fourth channel wall extends entirely between the first and second channel walls **152**, **154**. However, in other examples, the fourth channel wall **157** could be formed from wall segments similar to the third channel wall **156**.
[0078] The first arm **140** has a cross-sectional shape that generally corresponds to the cross-sectional shape of the first mounting channel **150** defined by the first-fourth channel walls **152**, **154**, **156**, **157**. In particular, by rear face **139** may also be considered a rear side **139** of the first arm **140** and the front face **141** may be considered a front side **141** of the first arm. First and second sides **166**, **168** extend between the rear and front sides **139**, **141**.
[0079] To have a corresponding cross-sectional shape, the first side **166** is a tapered surface that extends at the first angle α**1** relative to the front side **141**. The second side **168** is generally orthogonal to the rear and front sides **139**, **141**.

[0080] When the first guide **114** is mounted to the first arm **140**, the first side **166** will be adjacent the first channel wall **152**, the second side **168** will be adjacent the second channel wall **154**, the front side **141** will be adjacent the third channel wall **156** and the rear side **139** will be adjacent the fourth channel wall **157**.
[0081] A locking element **170** is carried by the first guide **114**. In this example, the locking element **170** is a thumbscrew threadedly attached to the mounting body **148** that can extend through the second channel wall **154**.
[0082] With reference to FIG. **9**, the locking element **170** is configured to apply a biasing force **172** (illustrated by arrow **172**) to the second side **158** of the first arm **140** to bias the first side **166** of the first arm **140** into abutment with the first channel wall **152** to secure the first guide **114** at an axial position along the first axis **120**. The biasing force **172** is applied along a biasing force axis **174** that is non-perpendicular to the first side **166** and the first channel wall **152** such that the biasing force **172** biases the front face **141** towards the third channel wall **156** (illustrated by arrow **176**) by way of the abutment between the first side **166** of the first arm **140** and the first channel wall **152**.
[0083] To provide repeatability and quick setup when transition from one workpiece to the next, e.g. when installing many handles or pulls within a kitchen, it is valuable to make sure that the system **100** is square and particularly that the first arm **140** is square to the first guide **114**.
[0084] The biasing provided by biasing force **172** self-centers the first arm **140** relative to the first guide **114**. This self-centering makes sure that the first arm **140** is square to the first guide **114**, such as illustrated by angle α**2** in FIG. **5**. The biasing force **172** also forces the front face **141** against the third channel wall **156** to make sure that the first arm **140** is not rotated about first axis **120** relative to the first guide **114**. Thus, this makes sure that the first arm **140** is parallel to the workpiece **102**.
[0085] While illustrated as a single thumbscrew, multiple thumbscrews could be provided. Also, latches, buckles, wedges, clamps, a spring biased pin, or other devices for provided biasing force **172** could be provided as a locking element.
[0086] In one example, the first guide **114** has a centering mark **180** that represents a center of the system **100**. When biasing force **172** is applied forcing first side **166** into the first channel wall **152**, the centering mark **180** aligns with a center of the second arm **142** along axis **122**.
[0087] While second guide **118** is illustrated as being attached to a third arm **182** of the extension arrangement **118**. The second guide **118** could be slidably attached to the second arm **142**.
[0088] The drill guides are configured to be slidable along the second or third arms **154**, **182** to adjust their lateral position along the second axis **122**.
[0089] The drill guides **119** include guide inserts **184** that are threaded into the guide body **186** of the drill guides **119**. The guide insert **184** includes a drill guide bore **185** that is used to guide a corresponding drill bit during drilling operations. The drill guide bore **185** has a drill guide bore axis **187** that is generally perpendicular to the first and second axes **120**, **122** and generally perpendicular to the first workpiece when in use.
[0090] While not mounted to a moveable drill guide body, the first arm **140** also includes a drill guide insert mounted therein that is aligned with the drill guide inserts of the drill guides **119** mounted to second arm **142**. This drill guide insert provides a third guide hole. In some implementations, this drill guide hole would be used when only a single hole is drilled, such as when drilling for a knob that has a single attachment member (e.g. a single screw).
[0091] In this example, an attachment bar **188** is attached to an end **187** of the second arm **142** and connects the third arm **182** to the second arm **142**. The attachment bar **188** is secured to the end of second arm **142** by screws **189** that thread into the end of the second arm **142**. The third arm **182** may slide relative to the attachment bar **188** to adjust the relative positioning of the second and third arms **142**, **182** so as to accommodate work pieces that have a large width W.
[0092] Here, a side **190** of the attachment bar **188** abuts the end **187** of the second arm **142**. This abutting relationship makes sure that the attachment bar **188** is square to the second arm **142**.
[0093] With reference to FIGS. **11-15**, while the first guide **114** provides for improved accuracy for

the system, the system **100** also includes first and second centering attachments **200** configured to properly and quickly space the guide bores **185** of the drill guides **119** for drilling attachment holes for attaching handles or pulls **108** that have at least two attachment points **202**, such as handle **108** in FIG. **12**.

[0094] The first and second centering attachments **200** removably attach to the drill guides **119** and cooperate with the attachment points **202** of the handle **108**. In particular, a portion of the centering attachments **200** extend into apertures **203** in the attachment points **202** of the handle **108** to properly adjust spacing S between the drill guides **119**.

[0095] The centering attachments **200** each have an attachment body **210** and centering pin **212** that defines a pin axis **214**. The attachment body **210** is configured to operably attach to a corresponding centering attachments **200** to the drill guide **119** with the pin axis **214** coaxial with the corresponding guide bore axis **187**.

[0096] In the illustrated example, the centering pin **212** is cone shaped such that the centering pin **212** self-centers within the apertures **203** of attachment points **202** of the handle **108**. Thus, when a user inserts the tip of the centering pin **212** with in the apertures **203** and pushes the handle against the centering attachments **200**, the drill guides **119** will slide along second arm **142** to the appropriate spacing S for drilling the holes for handle **108**.

[0097] The attachment body **210** may be in the form of a clip that is generally C-shaped. The attachment body **210** may have spaced apart legs **220** for removably clipping the attachment body **210** to the sides of the guide body **186** of the drill guide **119**. In one example, the legs **220** provide a friction fit engagement with the guide body **119**. In other examples, there may be a catch that provides an undercut that extends into or around a portion of the guide body **119** to provide an interference attachment of the attachment body **210** to the guide body **186**.

[0098] To properly align the centering pin **212** with the guide bores **185** and their guide bore axis **187** and pin axis **214**, a locating pin **230** may be provided. The locating pin **230** is sized and configured to extend into the guide bores **185** when the attachment body **210** is properly secured to the guide body **186**.

[0099] In this example, the legs **220** extend from a base member **221**. In particular, legs **220** extend on a first side of the base member **221**. The centering pin **212** extends on an opposite second side of the base **221**. In other words, the legs **220** extend from the base member **221** in a first direction generally parallel to axes **187**, **214** while the centering pin **212** extends in a second direction opposite the first direction generally parallel to axes **187**, **214**.

[0100] Further yet, in this example, the locating pin **230** extends in the same first direction on a first side of the base member **221** as the legs **220**. In this example, the locating pin **230** is straddled by legs **220** such that the locating pin is positioned laterally between the pair of legs **220**.

[0101] In this example, the drill guide bore **185** has a first inner diameter that is perpendicular to axis **187**. The centering pin has a first maximum outer diameter perpendicular to the pin axis **214**. The first maximum outer diameter is equal to or greater than the first inner diameter. By providing this relationship, the centering pin will always be greater than the inner diameter of aperture **203** of the attachment point **202** of the relevant handle **108**. This prevents potential inaccuracy if the centering pin **212** was smaller in outer dimension than the inner diameter of bore **185** or aperture **203**.

[0102] Similarly, the outer diameter of the locating pin **230** is sized to press fit or friction fit within the bore **185**.

[0103] At least one of the drill guides **119** and preferably all of the drill guides **119** are adjustably positionable parallel to axis **122** along the second arm **142**. Locking members are provided to releasably fix the position of the drill guides **119** relative to the second arm **142**.

[0104] FIG. **15** illustrates the system **100** prior to having the drill guides **119** at the proper spacing S that corresponds to the mounting handle mounting spacing (e.g. space between apertures **203**). FIG. **14** illustrates using the handle **108** and centering attachments **200** to properly space the drill

guides **119** along second arm **142**.
[0105] In operation, a method of use includes adjusting the spacing between first and second drill guides **119** of a drill jig system **100** to correspond to a handle mounting spacing between first and second mounting apertures **203** of handle **108** to be attached to the workpiece **102** using the centering attachments **200**.
[0106] The method includes aligning a first pin axis **214** of a first centering attachment **200** with a first guide bore axis **187**. The method includes aligning the second pin axis **214** of a second centering attachment **200** with a second guide bore axis **185** of a second drill guide **118**.
[0107] Then, the user inserts the first centering pin **214** into a first mounting aperture **203** of the handle **108**.
[0108] Then, the user adjusts the spacing S between the first and second drill guides **119** along the second axis **122** and inserts the second centering pin **214** into the second mounting aperture **203** of the handle **108**.
[0109] With the spacing S correct, the user can fix the position of the first drill guide **119** relative to the second drill guide **119** to fix the spacing S between the first and second drill guide axes **185** to correspond to the handle mounting spacing (e.g. spacing between the apertures **203** of the handle attachment points **202**.
[0110] In one method, the step of fixing the position of the first drill guide **119** relative to the second drill guide **119** includes fixing the position of the first drill guide **119** relative to the second arm **142**.
[0111] A method may also include a center of the handle **108** between the first and second mounting apertures **203** with a center of the first leg **140** or centering mark **180** through which the first axis **120** extends.
[0112] All references, including publications, patent applications, and patents cited herein are hereby incorporated by reference to the same extent as if each reference were individually and specifically indicated to be incorporated by reference and were set forth in its entirety herein.
[0113] The use of the terms “a” and “an” and “the” and similar referents in the context of describing the invention (especially in the context of the following claims) is to be construed to cover both the singular and the plural, unless otherwise indicated herein or clearly contradicted by context. The terms “comprising,” “having,” “including,” and “containing” are to be construed as open-ended terms (i.e., meaning “including, but not limited to,”) unless otherwise noted. Recitation of ranges of values herein are merely intended to serve as a shorthand method of referring individually to each separate value falling within the range, unless otherwise indicated herein, and each separate value is incorporated into the specification as if it were individually recited herein. All methods described herein can be performed in any suitable order unless otherwise indicated herein or otherwise clearly contradicted by context. The use of any and all examples, or exemplary language (e.g., “such as”) provided herein, is intended merely to better illuminate the invention and does not pose a limitation on the scope of the invention unless otherwise claimed. No language in the specification should be construed as indicating any non-claimed element as essential to the practice of the invention.
[0114] Preferred embodiments of this invention are described herein, including the best mode known to the inventors for carrying out the invention. Variations of those preferred embodiments may become apparent to those of ordinary skill in the art upon reading the foregoing description. The inventors expect skilled artisans to employ such variations as appropriate, and the inventors intend for the invention to be practiced otherwise than as specifically described herein. Accordingly, this invention includes all modifications and equivalents of the subject matter recited in the claims appended hereto as permitted by applicable law. Moreover, any combination of the above-described elements in all possible variations thereof is encompassed by the invention unless otherwise indicated herein or otherwise clearly contradicted by context.

Claims

1. An adjustable drill jig system for guiding a drill to drill holes in a workpiece, the workpiece having a top edge and a first workpiece face, the system comprising: a T-shaped member having a first arm defining a first axis and a second arm defining a second axis, the first arm attached to the second arm in a generally perpendicular orientation with the first and second axes generally perpendicular to one another, the first arm having opposed first and second sides extending generally parallel to the first axis, the first arm having a first face that is generally parallel to the workpiece in use, the first side being a first tapered surface extending at a non-perpendicular first angle to the first face; a first guide having a mounting channel receiving the first arm therein, the mounting channel having opposed first and second channel walls and a third channel wall between the first and second channel walls, the first channel wall extending at the first angle relative to third channel wall defining an undercut region, the first channel wall being adjacent the first side of the first arm with the first side extending into the undercut region, the second channel wall being adjacent the second side, and the third channel wall being adjacent the first face when the first guide is mounted on the first arm; and a locking element mounted to the second channel wall for applying a biasing force to the second side of the first arm to bias the first side of the first arm into abutment with the first channel wall and into the undercut region to secure the first guide at an axial position along the first axis, the biasing force being applied along a biasing force axis that is non-perpendicular to the first side and the first channel wall such that the biasing force biases the first face towards the third channel wall by way of the abutment between the first side of the first arm and the first channel wall.

2. The adjustable drill jig system of claim 1, further comprising at least one drill guide mounted to the second arm, the drill guide having a drill guide bore extending therethrough along a drill guide bore axis that is generally perpendicular to the first and second axes and generally perpendicular to the first workpiece face of the workpiece in use, the drill guide adjustably positionable relative to the second arm along the second axis.

3. The adjustable drill jig system of claim 1, wherein the first guide has a first workpiece locating abutment engageable with the first edge of the workpiece for locating the T-shaped member relative to the workpiece, the first workpiece locating abutment is generally orthogonal to the first axis.

4. The adjustable drill jig system of claim 1, wherein the locking element is a threaded member threadedly attached to the first guide.

5. The adjustable drill jig system of claim 1, wherein the locking element is selected from the group consisting of a spring biased pin, a latch, or a buckle.

6. The adjustable drill jig system of claim 1, wherein the first angle is between about 30 and 75 degrees.

7. The adjustable drill jig system of claim 1, wherein the third channel wall extends entirely between the first and second channel walls.

8. The adjustable drill jig system of claim 1, wherein the biasing force biases the first face into the third channel wall.

9. The adjustable drill jig system of claim 1, wherein the mounting channel has a fourth channel wall opposite the third channel wall, the fourth channel wall between the first and second channel walls, the mounting channel being an aperture formed through the first guide.

10. The adjustable drill jig system of claim 1, wherein the second channel wall is generally orthogonal to the third channel wall and the second side of the first arm is generally orthogonal to the first face.

11. An adjustable drill jig system for guiding a drill to drill at least two holes in a workpiece at a predetermined spacing, the workpiece having a top edge and a first workpiece face, the system comprising: a T-shaped member having a first arm defining a first axis and a second arm defining a

second axis, the first arm attached to the second arm in a generally perpendicular orientation with the first and second axes generally perpendicular to one another; a first guide adjustably mounted to the first arm for adjusting a position of the first guide along the first axis; and a first drill guide mounted to the second arm having a first drill guide bore defining a first guide bore axis that is generally perpendicular to the first and second axes and orthogonal to the first workpiece face in use; a second drill guide mounted to the second arm having a second drill guide bore defining a second guide bore axis that is generally perpendicular to the first and second axes, orthogonal to the first workpiece face in use, and parallel to the first guide bore axis; a first centering attachment having a first attachment body and a first centering pin defining a first pin axis, the first attachment body configured to operably attach to the first drill guide with the first pin axis coaxial with the first guide bore axis; a second centering attachment having a second attachment body and a second centering pin defining a second pin axis, the second attachment body configured to operably attach to the second drill guide with the second pin axis coaxial with the second guide bore axis; wherein the first and second drill guides are mounted to the second arm such that a spacing between the first and second guide bore axes is adjustable.

12. The drill jig system of claim 11, wherein the first and second centering pins are cone shaped.

13. The drill jig system of claim 12, wherein the first attachment body is in the form of a clip and is C-shaped, the attachment body includes a pair of spaced apart legs that removably clip to the first drill guide.

14. The drill jig system of claim 13, wherein the first attachment body includes a first locating pin that is insertable into the first drill guide bore to align the first pin axis with the first guide bore axis when attached to the first drill guide.

15. The drill jig system of claim 14, wherein the first attachment body includes a base member, the first centering pin extending from the base member in a first direction, the first locating pin extending from the base member in a second opposite direction.

16. The drill jig system of claim 15, wherein the first attachment body includes a pair of spaced apart legs configured to clip the first attachment body to the first drill guide with the first locating pin inserted into the first drill guide bore, the spaced apart legs extending form the base member in the second direction with the first locating pin positioned laterally between the pair of spaced apart legs.

17. The drill jig system of claim 11, wherein the first drill guide is moveable relative to the second arm.

18. The drill jig system of claim 11, wherein the first drill guide bore has a first inner diameter perpendicular to the first guide bore axis and the first centering pin has a first maximum outer diameter perpendicular to the first pin axis, the first maximum outer diameter being equal to or greater than the first inner diameter.

19. The drill jig system of claim 17, including a locking member releasably fixing the position of the first drill guide to the second arm.

20. A method of adjusting the spacing between first and second drill guides of a drill jig system of claim 11 to correspond to a handle mounting spacing between first and second mounting apertures of a handle to be attached to the workpiece, the method comprising: aligning the first pin axis with the first guide bore axis; aligning the second pin axis with the second guide bore axis; inserting the first centering pin into the first mounting aperture of the handle; adjusting the spacing between the first and second drill guides along the second axis and inserting the second centering pin into the second mounting aperture of the handle; fixing the position of the first drill guide relative to the second drill guide to fix the spacing between the first and second drill guide axes to correspond to the handle mounting spacing.

21. The method of claim 20, wherein the step of fixing the position of the first drill guide relative to the second drill guide includes fixing the position of the first drill guide relative to the second arm.

22. The method of claim 20, wherein the first and second drill guides are moveable relative to the

second arm; the method further including aligning a center of the handle between the first and second mounting apertures with a center of the first leg through which the first axis extends.

23. A centering attachment for use with a drill guide having a drill guide bore defining a guide bore axis, the centering attachment comprising: an attachment body and a first centering pin defining a pin axis, the attachment body configured to operably attach to the first drill guide with the pin axis coaxial with the guide bore axis.

24. The centering attachment of claim 23, wherein the centering pin is cone shaped.

25. The centering attachment of claim 23, wherein the attachment body is in the form of a clip and is C-shaped, the attachment body includes a pair of spaced apart legs that are configured to removably clip to the drill guide.

26. The centering attachment of claim 23, wherein the attachment body includes a locating pin that is insertable into the drill guide bore to align the pin axis with the guide bore axis when attached to the drill guide.

27. The centering attachment of claim 26, wherein the attachment body includes a base member, the first centering pin extends from the base member in a first direction, the first locating pin extending from the base member in a second opposite direction.

28. The centering attachment of claim 27, wherein the attachment body includes a pair of spaced apart legs configured to clip the attachment body to the drill guide with the locating pin inserted into the drill guide bore, the spaced apart legs extending form the base member in the second direction with the locating pin positioned laterally between the pair of spaced apart legs.

29. The drill jig system of claim 26, wherein: the centering pin has a first maximum outer diameter perpendicular to the pin axis; the locating pin has a second maximum outer diameter perpendicular to the pin axis; and the first maximum outer diameter being greater than the maximum outer diameter.