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Welding jig

Abstract

A welding jig (**3, 103, 203**) for holding a horizontal member relative to a vertical member is disclosed. The jig has a base (**5, 105, 205**) having a clamp (**8, 108, 208**) able to clamp the base to the vertical member and constituting a first, coarse, vertical adjustment mechanism. A frame (**11, 111, 211**) is interconnected to the base by a first threaded member (**12, 112, 212**) constituting a second, fine, vertical adjustment mechanism. A pair of supports (**21, 121, 221**) is slidingly mounted on the frame and movable between predetermined positions to constitute a first, coarse, horizontal adjustment mechanism. First and second vise parts (**43, 44, 143, 144, 271, 272**) each threadably mounted on a corresponding one of the supports and movable towards and away from each other constitute a vise mechanism for clamping the horizontal member.

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Background/Summary

CROSS REFERENCE TO RELATED APPLICATIONS

(1) This application is a National Phase filing under 35 U.S.C. § 371 of PCT/AU2021/050116 filed on Feb. 11, 2021; which application in turn claims priority to application Ser. No. 20/209,00451 filed in Australia on Feb. 18, 2020, application Ser. No. 20/209,01745 filed in Australia on May 28, 2020 and application Ser. No. 20/209,03737 filed in Australia on Oct. 15, 2020. The entire contents of each application are hereby incorporated by reference.

FIELD OF THE INVENTION

(2) The present invention relates to welding jigs and, in particular, to welding jigs able to be used in remote rural areas.

BACKGROUND ART

(3) Welding jigs are often used to hold two or more parts together in a desired final configuration which then enables the parts to be welded. At the conclusion of the welding, the parts are released from the jig. In most welding shops they are a number of welders or, if only a single welder then at least one other person able to assist in a general capacity. As a consequence, in a welding shop there are more than a single pair of hands able to be brought to bear on any particular welding task.

(4) However, in outback rural areas, such as outback Australia, normally only one person is available to work on any given task. A particular problem which arises is in the erection of cattle yards. Typically cattle yards include a multitude of vertical steel uprights and horizontal rails. Although prefabrication is utilised wherever possible, often the specific requirements of the site, or the individual requirements of the owner, mean that individual and specific fabrication is required.

(5) A typical problem is that whilst a vertical steel upright can be secured by having its lower end partially buried in the ground, horizontal members, such as rails, must be held in their final horizontal position during the welding procedure. Normally this involves a weld at each end of the rail.

(6) If two persons were present, one person could hold the middle of the rail and the other person could weld each end in turn. However, where only one person, the welder, is present, then some sort of apparatus is required to hold the horizontal rail in the desired final position.

(7) In addition, although a bracket may be fixed to a vertical member using a pipe chain or strap clamp, this does not provide much practical assistance to a single person. The ability to hold a bracket and simultaneously manipulate a chain clamp assembly while maintaining a capacity to accurately adjust the clamp so that it can be tightly clamped to a wide range of pipe sizes is beyond the ability of most people when only a single pair of hands is available.

(8) Prior art searches conducted after the priority date have disclosed US Patent Application No US 2016/0097217A1 Loehr which exemplifies the above-mentioned support bracket and clamp technology.

GENESIS OF THE INVENTION

(9) The Genesis of the present invention is a desire to at least ameliorate the above-mentioned problems.

SUMMARY OF THE INVENTION

(10) In accordance with a first aspect of the present invention there is disclosed a welding jig for holding a horizontal member relative to a vertical member, said jig comprising a base having a clamp able to clamp the base to the vertical member and constituting a first, coarse, vertical adjustment mechanism, a frame interconnected to said base by a first threaded member constituting a second, fine, vertical adjustment mechanism; a pair of supports slidingly mounted on said frame

and movable between predetermined positions to constitute a first, coarse, horizontal adjustment mechanism; and first and second vise parts each threadably mounted on a corresponding one of said supports and movable towards and away from each other to constitute a vise mechanism, said vise mechanism clamping said horizontal member and having a centre which is horizontally adjustable relative to said vertical member by adjustment of the threaded engagement between said supports and said vise parts.
(11) Preferably, the base clamp comprises a first chain able to be tightened about the vertical member.
(12) Preferably, the first threaded member is rigidly connected to the frame and is threadably engaged with a rotatable adjustment member of the base.
(13) Preferably, the frame has a spaced apart sequence of apertures and each of the supports has an elongate member releasably engageable with one of said apertures to set the predetermined positions.
(14) Preferably, each of the supports has a slot therethrough, each of the vise parts has a female threaded member retained in a corresponding one of the slots, and a male threaded member passes through the corresponding female threaded member.
(15) Preferably, a second chain extends between the supports.
(16) Preferably, the first chain is able to be tightened by a plier like tool.
(17) Preferably, the first chain is able to be tightened by an over centre toggle arm.
(18) Preferably, the rest position of the over centre toggle arm is adjustable.
(19) Preferably, the over centre toggle arm is pivoted relative to a support and the support is pivoted to said base.
(20) Preferably, the over centre toggle arm is adjustable by adjusting the position of said support.
(21) Preferably, the vise or vyce parts comprise pivoted pads.

Description

BRIEF DESCRIPTION OF THE DRAWINGS
(1) A preferred embodiment of the invention will now be described, by way of example only, with reference to the accompanying drawings in which:
(2) FIG. **1** is a perspective view from above showing the welding jig of the first embodiment,
(3) FIG. **2** is a perspective view from below showing the welding jig of FIG. **1**,
(4) FIG. **3** is a perspective view of the preferred form of chain clamp for use with the jig of FIG. **1**,
(5) FIG. **4** is a perspective view from below and to one side of the welding jig of the second embodiment,
(6) FIG. **5** is a perspective view from below and to the other side of the welding jig of FIG. **4**,
(7) FIG. **6** is a perspective view from below of the welding jig of FIG. **4** but in the opposite direction,
(8) FIG. **7** is a perspective view from above and looking in yet another direction,
(9) FIG. **8** is a near vertical inverted view of the welding jig of FIG. **4**,
(10) FIG. **9** is a perspective view of the welding jig of FIG. **4** in an “inverted” position showing the horizontal rail **102** prior to clamping,
(11) FIG. **10** is a horizontal view of the welding jig of a third embodiment in an upright position,
(12) FIG. **11** is a perspective view of the welding jig of FIG. **10**,
(13) FIG. **12** is a perspective view of the welding jig of FIGS. **10** and **11** in an inverted position,
(14) FIG. **13** is a perspective view similar to FIG. **12** but from a different angle,
(15) FIG. **14** is another perspective view but showing the horizontal rail held in its intended final position,
(16) FIG. **15** is a view similar to FIG. **14** but from a different angle,

(17) FIG. **16** is a near vertical view of the welding jig of the third embodiment,
(18) FIG. **17** is a near horizontal view showing the horizontal rail in its initial, rough, position,
(19) FIG. **18** is an inclined perspective view of the welding jig illustrated in FIG. **17**, and
(20) FIG. **19** is a perspective view of the toggle arm arrangement.

DETAILED DESCRIPTION

(21) As seen in FIG. **1**, a portion of a cattle yard under construction is illustrated and, in particular, a vertical post **1** and a horizontal rail **2** which are about to be welded are illustrated. The post **1** and rail **2** are held in the intended final position by means of a jig **3**.

(22) The jig **3** has a Y-shaped base **5** with a hole **6** through which a chain **7** passes. As seen in FIG. **3**, the chain **7** is engaged with a manual implement **8** such as the locking pliers gripping device is sold under the Registered Trade Mark VISE-GRIP. As a consequence, the chain **7** and implement **8** together constitute a clamp which enables the base **5** to be clamped to the vertical post **1**.

(23) Referring again to FIG. **1**, located above the base **5** is a horizontal frame **11** from which a fixed threaded rod **12** extends downwardly. The threaded rod **12** passes through two sleeves **13**, **14**. The lower sleeve **14** is slotted at **16**. The threaded rod **12** also passes through a rotatable female threaded disc **17**. The free end of the rod **12** has an aperture through which a roll pin **18** is inserted, thereby retaining the rod **12** within the sleeves **13**, **14**. As a consequence, as seen in FIG. **1**, rotating the threaded disc **17** either raises or lowers the frame **11**.

(24) It will be apparent from the foregoing that the chain **7** and implement **8** constitute a first vertical adjustment mechanism which permits a coarse vertical adjustment to be made, whilst the threaded disc **17** and threaded rod **12** constitute a second vertical adjustment mechanism which permits a fine vertical adjustment of the frame **11** to be made.

(25) Slidingly mounted on the frame **11** are two supports **21**, **22** each of which is provided with a corresponding through slot **24**, **25**. As best seen in FIG. **2**, the underside of the frame **11** is provided with a series of spaced apart apertures **27** which enable the supports **21**, **22** to be located in any one of a number of predetermined positions. The positions are determined by means of two spring loaded plungers **31**, **32**. Each of the plungers **31**, **32** is located within a corresponding externally threaded hollow sleeve **33**, **34** and has a swing handle **35**, **36** which abuts a corresponding ramped collar **37**, **38**.

(26) As a consequence of the above described construction, operation of the handles **35**, **36** enables the supports **21**, **22** to be quickly engaged with, or disengage from, the apertures **27** to thereby provide a quick first horizontal adjustment mechanism which provides for a coarse adjustment of the position of the supports **21**, **22** relative to the frame **11**. Extending across the distal ends of the supports **21**, **22** is a chain **40**.

(27) Slidingly located within the slots **24**, **25** is a corresponding one of two vise parts **43**, **44** each of which has an internally threaded collar **45**, **46**. A threaded bar **47**, **48** is rotatably mounted in a corresponding one of two clamps **51**, **52** which are preferably provided with a V-shaped mouth **53**, **54** so as to easily grasp the horizontal rail **2**. A corresponding pair of handles **55**, **56** enables the threaded bars **47**, **48** to be rotated to thereby adjust the position of the V-shaped mouths **53**, **54** relative to the frame **11**. Thus the threaded bars **47**, **48** provide a second horizontal adjustment mechanism which provides for a fine adjustment of the position of the V-shaped mouths **53**, **54**.

(28) It will be apparent to those skilled in the art from the foregoing that two of the above described jigs **3** can be used to quickly and securely hold the horizontal rail **2** in its intended final welded position. Each of the jigs **3** is clamped to a corresponding one of, typically, a pair of vertical posts **1** at roughly the intended height of the horizontal rail **2**. Irrespective of whether the jigs **3** are mounted in the position illustrated in FIG. **1**, or in the position illustrated in FIG. **2**, or one “up” and one “down”, each end of the horizontal rail **2** can be inserted into the space formed between the frame **11** and the chain **40**. This holds the horizontal rail **2** in approximately the desired position. Then the single operator is able to pay attention to one end of the horizontal rail **2** and, if necessary, adjusts the position of the supports **21**, **22**. Then the horizontal rail **2** is clamped between the V-

shaped mouths **53**, **54**. The handles **55**, **56** can be rotated for the final horizontal adjustment of the rail **2**. Similarly, the threaded disc **17** can be rotated for the final, fine, adjustment of the vertical position of the rail **2**.
(29) The identical procedure is then carried out at the other end of the horizontal rail **2**. Normally this is sufficient, but final adjustments can be made to each end again, if necessary. Then the sole operator is able to weld each end of the horizontal rail **2** in turn whilst the rail **2** is held in the desired position. Thus the welder requires no other human assistance.
(30) As seen in FIGS. **4**-**9**, a jig of a second embodiment is illustrated and in which like elements to the first embodiment have a designation increased by 100. As for FIGS. **1** and **2**, a portion of a cattle yard under construction is illustrated and, in particular, a vertical post **101** and a horizontal rail **102** which are about to be welded are illustrated. The post **101** and rail **102** are held in the intended final position by means of the jig **103** of the second embodiment.
(31) The jig **103** has a generally rectangular base **105** from which a chain **107** extends. As seen in FIGS. **4** and **7**, the chain **107** is engaged with an over centre toggle arm **108**. As a consequence, the chain **107** and arm **108** together constitute a clamp which enables the base **105** to be clamped to the vertical post **101**.
(32) Located above the base **105** is a horizontal frame **111** from which a fixed threaded rod **112** extends downwardly. The threaded rod **112** passes through two sleeves **113**, **114**. The lower sleeve **114** is slotted at **116**. The threaded rod **112** also passes through a rotatable female threaded disc **117**. The free end of the rod **112** has an aperture through which a roll pin **118** is inserted, thereby retaining the rod **112** within the sleeves **113**, **114**. As a consequence, rotating the threaded disc **117** first one way and then the other either raises or lowers the frame **111**.
(33) Extending outwardly from the base **105** are two pairs of pivotally mounted pads **161**, **162** and **163**, **164**. Each of these pads is preferably provided with a built-in permanent magnet which therefore enables the base **105** in most instances to adhere to the vertical steel post **101**. This is an advantage in securing the chain **107** by means of the over centre toggle arm **108**. In known fashion the arm **108** has a first adjustment screw **165** which enables the tension within the clamped chain **107** to be adjusted. In addition, the toggle arm **108** is pivoted on a hinge **167** mounted on the base **105**. As best seen in FIGS. **5** and **8**, a second adjustment screw **168** is threadably engaged with the base **105** and extends through it to abut the toggle arm **108**. As a consequence, the second adjustment screw **168** can be manipulated to change the rest position of the toggle arm **108**. This enables the clamp associated with the base **105** to cater for a wide variety of vertical posts **101** having different diameters.
(34) It will be apparent from the foregoing that the chain **107** and toggle arm **108** constitute a first vertical adjustment mechanism which permits a coarse vertical adjustment of the frame **111** to be made, whilst the threaded disc **117** and threaded rod **112** constitute a second vertical adjustment mechanism which permits a fine vertical adjustment of the frame **111** to be made.
(35) Slidingly mounted on the frame **111** are two supports **121**, **122** each of which is provided with a corresponding through slot **124**, **125**. The frame **111** is provided with a series of spaced apart apertures **127** which enable the supports **121**, **122** to be located in any one of a number of predetermined positions. The positions are determined by means of two pins **131**, **132**. Each of the pins **131**, **132** is able to be inserted into, and withdrawn from, any one of the spaced apart apertures **127** and in this way determine the spacing between the two supports **121**, **122**.
(36) This thereby provides a quick first horizontal adjustment mechanism which provides for a coarse adjustment of the position of the supports **121**, **122** relative to the frame **111**. Extending across the distal ends of the supports **121**, **122** is a second chain **140**.
(37) Slidingly located within the slots **124**, **125** is a corresponding one of two vie parts **143**, **144** each of which has a one of two pairs of pads **171**, **172** each of which is mounted on a corresponding threaded rod **181**, **182** engaged with the supports **121**, **122**. The pads **171**, **172** are again each preferably provided with a permanent magnet and thus easily grasp the horizontal rail

102. Thus the threaded rods **181**, **182** provide a second horizontal adjustment mechanism which provides for a fine adjustment of the position of the pads **171**, **172**.
(38) It will be apparent to those skilled in the art from the foregoing that two of the above described jigs **103** can be used to quickly and securely hold the horizontal rail **102** in its intended final welded position. Each of the jigs **103** is clamped to a corresponding one of, typically, a pair of vertical posts **101** at roughly the intended height of the horizontal rail **102**. Irrespective of whether the jigs **103** are mounted in the position illustrated in FIGS. **4**-**7**, or are inverted as seen in FIG. **9**, each end of the horizontal rail **102** can be inserted into the space formed between the frame **111** and the second chain **140**. This holds the horizontal rail **102** in approximately the desired position as seen in FIG. **9**. Then the single operator is able to pay attention to one end of the horizontal rail **102** and, if necessary, adjusts the position of the supports **121**, **122**. Then the horizontal rail **102** is clamped between the pads **171**, **172**. The rods **181**, **182** can be rotated for the final horizontal adjustment of the rail **102**. Similarly, the threaded disc **117** can be rotated for the final, fine, adjustment of the vertical position of this end of the rail **102**.
(39) The identical procedure is then carried out at the other end of the horizontal rail **102**. Normally this is sufficient, but final adjustments can be made to each end again, if necessary. Then the sole operator is able to weld each end of the horizontal rail **102** in turn whilst the rail **102** is held in the desired position. Thus the welder requires no other human assistance.
(40) As seen in FIGS. **10**-**19**, a jig of a third embodiment is illustrated and in which like elements to the second embodiment have a designation increased by 100. As for FIGS. **4**-**9**, a portion of a cattle yard under construction is illustrated and, in particular, a vertical post **201** and a horizontal rail **202** which are about to be welded are illustrated. The post **201** and rail **202** are held in the intended final position by means of the jig **203** of the second embodiment.
(41) The jig **203** has a generally rectangular base **205** from which a chain **207** extends. As seen in FIG. **16**, the chain **207** is engaged with an over centre toggle arm **208**. The over centre toggle arm **28** is pivoted relative to the base **205** by means of a hinge **267** (FIG. **18**). As a consequence, the chain **207** and over centre toggle arm **208** together constitute a clamp which enables the base **205** to be clamped to the vertical post **201**. A handle **299** is connected to the base **205** and assists in holding the base **205** in the desired position whilst the chain **207** is locked in place.
(42) As see in FIG. **11**, located above the base **205** is a horizontal frame **211** from which a fixed threaded rod **212** extends downwardly. The threaded rod **212** passes through two sleeves **213**, **214**. The lower sleeve **214** is slotted at **216** as best seen in FIG. **12**. The threaded rod **212** also passes through a rotatable female threaded disc **217** (FIG. **14**). The free end of the rod **212** has an aperture through which a pin **218** (FIG. **10**) is inserted, thereby retaining the rod **212** within the sleeves **213**, **214**. As a consequence, rotating the threaded disc **217** first one way and then the other either raises or lowers the frame **211**.
(43) Extending outwardly from the base **205** are two pairs of pivotally mounted pads **261**, **262** and **263**, **264** (FIGS. **11** and **12**). Each of these pads is preferably provided with a built-in permanent magnet which therefore enables the base **205** in most instances to adhere to the vertical steel post **201**. This reduces the effort required by the operator in securing the chain **207** by means of the over centre toggle arm **208**.
(44) As seen in FIG. **19**, the over centre toggle arm **208** differs substantially from the over centre toggle arm **108** in that it is a spring loaded over centre clamp that allows the hook **303** to be easily extended to grab the chain **207**. This is achieved by squeezing the clamp handle **301** to move it towards the frame handle **299**. By doing this the spring **302** is compressed and the hook **303** is moved forwardly towards the post **201**. When the hook **303** has been loosely engaged with the chain **207**, the handle **301** is released. This causes the spring **302** to urge the fixed transverse pin **307** of the central rod **306** backwardly away from the post **201**. As a consequence, the clamp chain **207** loosely grips the pipe **201** and does not fall away from hook **303**. An adjustment screw **265** enables the tension within the clamped chain **207** to be adjusted. This is achieved by rotating the

knurled disc **305** which is secured to the adjustment screw **265**.
(45) The hinge **267** as seen in FIG. **19** has an extension plate **304** that slidingly engages with the hook **303** to prevent the hook **303** from twisting out of position as it is manipulated to grip the chain **207**. Full clamping force is then achieved by pushing the over centre clamp handle **301** towards the hook **303**. In addition, since the toggle arm **208** is pivoted on a hinge **267** (FIG. **18**) mounted on the base **205**, a second adjustment is possible. As best seen in FIG. **16**, a second adjustment screw **268** is threadably engaged with the base **205** and extends through it to abut the toggle arm hinge **267**. As a consequence, the second adjustment screw **268** can be manipulated to change the rest position of the toggle arm **208**. This enables the clamp associated with the base **105** to cater for a wide variety of vertical posts **201** having different diameters.
(46) It will be apparent from the foregoing that the chain **207** and toggle arm **208** constitute a first vertical adjustment mechanism which permits a coarse vertical adjustment of the frame **211** to be made, whilst the threaded disc **217** and threaded rod **212** constitute a second vertical adjustment mechanism which permits a fine vertical adjustment of the frame **211** to be made.
(47) As seen in FIG. **11**, slidingly mounted on the frame **211** are two supports **221**, **222** each of which is provided with a corresponding through slot **224**, **225**. The frame **211** is provided with a series of spaced apart apertures **227** which enable the supports **221**, **222** to be located in any one of a number of predetermined positions. The positions are determined by means of two pins **231**, **232** (FIG. **12**). Each of the pins **231**, **232** is able to be inserted into, and withdrawn from, any one of the spaced apart apertures **227** and in this way determine the spacing between the two supports **221**, **222**.
(48) This thereby provides a quick first horizontal adjustment mechanism which provides for a coarse adjustment of the position of the supports **221**, **222** relative to the frame **211**. Extending across the distal ends of the supports **221**, **222** is a second chain **240** (FIGS. **13** and **14**). Each distal end of the supports **221**, **222** includes a hook **298** which enables the position of the second chain **240** to be easily adjusted and thereby determine a first rough position for the horizontal rail **202** as seen in FIG. **17**.
(49) As best seen in FIG. **13**, slidingly located within the slots **224**, **225** is a corresponding one of two vise parts **243**, **244** each of which has a one of two pairs of pads **271**, **272** (FIG. **17**) each of which is mounted on a corresponding threaded rod **281**, **282** engaged with the supports **221**, **222**. The pads **271**, **272** are again each preferably provided with a permanent magnet and thus easily grasp the horizontal rail **202**. Thus the threaded rods **281**, **282** provide a second horizontal adjustment mechanism which provides for a fine adjustment of the position of the pads **271**, **272**.
(50) It will be apparent to those skilled in the art from the foregoing that two of the above described jigs **203** can be used to quickly and securely hold the horizontal rail **202** in its intended final welded position. Each of the jigs **203** is clamped to a corresponding one of, typically, a pair of vertical posts **201** at roughly the intended height of the horizontal rail **202**. Irrespective of whether the jigs **203** are mounted in the position illustrated in FIGS. **10** and **11**, or are inverted as seen in FIGS. **12-18**, each end of the horizontal rail **202** can be inserted into the space formed between the frame **211** and the second chain **240**. This holds the horizontal rail **202** in approximately the desired position as seen in FIG. **17**. Then the single operator is able to pay attention to one end of the horizontal rail **202** and, if necessary, adjusts the position of the supports **221**, **222**. Then the horizontal rail **202** is clamped between the pads **271**, **272**. The rods **281**, **282** can be rotated for the final horizontal adjustment of the rail **202**. Similarly, the threaded disc **217** can be rotated for the final, fine, adjustment of the vertical position of this end of the rail **202**.
(51) The identical procedure is then carried out at the other end of the horizontal rail **202**. Normally this is sufficient, but final adjustments can be made to each end again, if necessary. Then the sole operator is able to weld each end of the horizontal rail **202** in turn whilst the rail **202** is held in the desired position. Thus the welder requires no other human assistance.
(52) The foregoing describes only some embodiments of the present invention and modifications,

obvious to those skilled in the welding arts, can be made thereto without departing from the scope of the present invention. For example, equivalents of each of the above described mechanisms can be used. Also the V-shaped mouths **53**, **54** can be pivoted relative to the vise parts **43**, **44** or can include pivoted pads **171**, **172** to easily adjust to different rail diameters. The base **5**, **105** can be similarly modified.
(53) The term “comprising” (and its grammatical variations) as used herein is used in the inclusive sense of “including” or “having” and not in the exclusive sense of “consisting only of”.

Claims

1. A welding jig for holding a horizontal member relative to a vertical member, said jig comprising a base having a clamp able to clamp the base to the vertical member and constituting a first, coarse, vertical adjustment mechanism, a frame interconnected to said base by a first threaded member constituting a second, fine, vertical adjustment mechanism; a pair of supports slidingly mounted on said frame and movable between predetermined positions to constitute a first, coarse, horizontal adjustment mechanism; and first and second vise parts each threadably mounted on a corresponding one of said supports and movable towards and away from each other to constitute a vise mechanism, said vise mechanism clamping said horizontal member and having a centre which is horizontally adjustable relative to said vertical member by adjustment of the threaded engagement between said supports and said vise parts.
2. The jig as claimed in claim 1 wherein said base clamp comprises a first chain able to be tightened about said vertical member.
3. The jig as claimed in claim 2 wherein said first chain is able to be tightened by a plier tool.
4. The jig as claimed in claim 2 wherein said first chain is able to be tightened by an over centre toggle arm.
5. The jig as claimed in claim 4 wherein the rest position of said over centre toggle arm is adjustable.
6. The jig as claimed in claim 5 wherein said over centre toggle arm is pivoted relative to a support and said support is pivoted to said base.
7. The jig as claimed in claim 6 wherein said over centre toggle arm is adjustable by adjusting the position of said support.
8. The jig as claimed in claim 2 wherein said first threaded member is rigidly connected to said frame and is threadably engaged with a rotatable adjustment member of said base.
9. The jig as claimed in claim 2 wherein said frame has a spaced apart sequence of apertures and each of said supports has an elongate member releasably engageable with one of said apertures to set said predetermined positions.
10. The jig as claimed in claim 2 wherein each of said supports has a slot therethrough, each of said vise parts has a female threaded member retained in a corresponding one of said slots, and a male threaded member passes through the corresponding female threaded member.
11. The jig as claimed in claim 2 wherein said vise parts comprise pivoted pads.
12. The jig as claimed in claim 1 wherein said first threaded member is rigidly connected to said frame and is threadably engaged with a rotatable adjustment member of said base.
13. The jig as claimed in claim 12 wherein said frame has a spaced apart sequence of apertures and each of said supports has an elongate member releasably engageable with one of said apertures to set said predetermined positions.
14. The jig as claimed in claim 12 wherein each of said supports has a slot therethrough, each of said vise parts has a female threaded member retained in a corresponding one of said slots, and a male threaded member passes through the corresponding female threaded member.
15. The jig as claimed in claim 12 wherein said vise parts comprise pivoted pads.
16. The jig as claimed in claim 1 wherein said frame has a spaced apart sequence of apertures and

each of said supports has an elongate member releasably engageable with one of said apertures to set said predetermined positions.

17. The jig as claimed in claim 16 wherein each of said supports has a slot therethrough, each of said vise parts has a female threaded member retained in a corresponding one of said slots, and a male threaded member passes through the corresponding female threaded member.

18. The jig as claimed in claim 1 wherein each of said supports has a slot therethrough, each of said vise parts has a female threaded member retained in a corresponding one of said slots, and a male threaded member passes through the corresponding female threaded member.

19. The jig as claimed in claim 18 wherein a second chain extends between said supports.

20. The jig as claimed in claim 1 wherein said vise parts comprise pivoted pads.