

April 10, 1934.

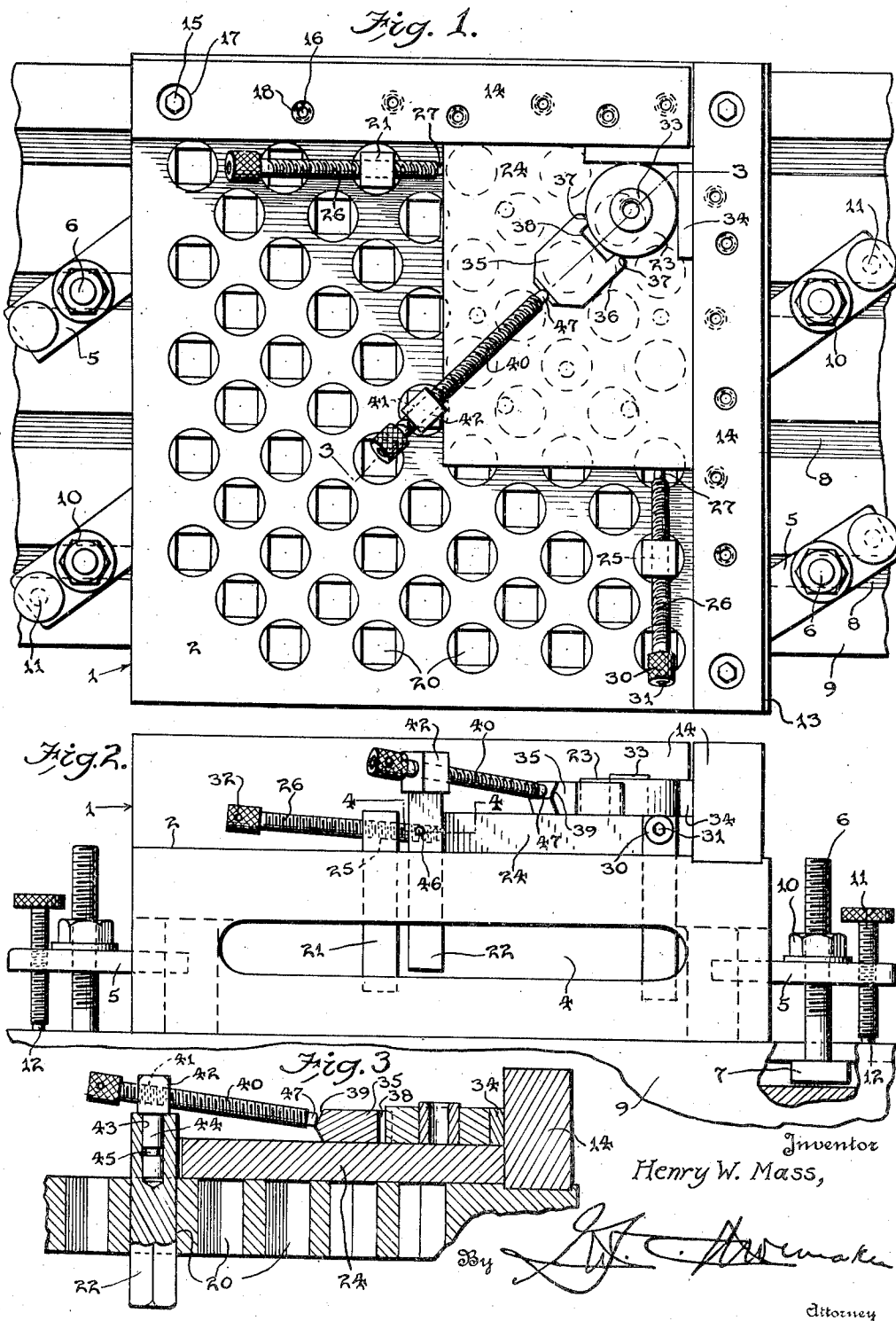
H. W. MASS

1,954,708

WORK HOLDING CLAMP AND DRILL JIG

Filed Jan. 18, 1933

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Fig. 5.

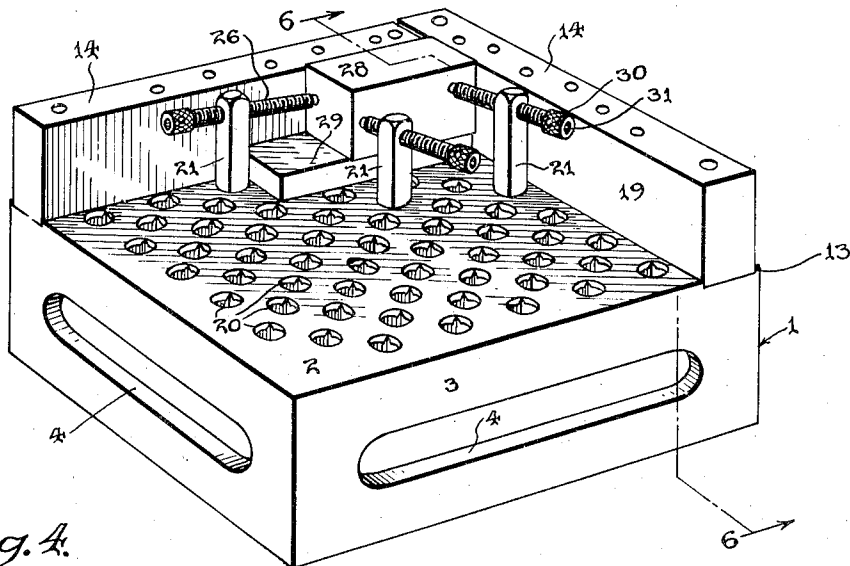


Fig. 4.

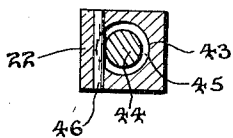
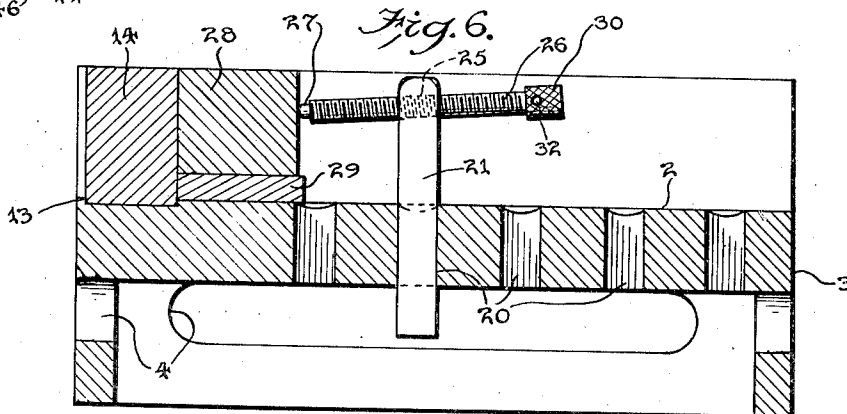


Fig. 6.



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UNITED STATES PATENT OFFICE

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WORK HOLDING CLAMP AND DRILL JIG

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7 Claims. (Cl. 77-62)

The invention relates to a work holding clamp and drill jig.

The object of the present invention is to improve the construction of work holding clamps and drill jigs and to provide a simple, practical and comparatively inexpensive construction equipped with means for squaring up work and securely clamping the same in position for drilling, reaming or other machine or hand operations.

A further object of the invention is to provide a work holding clamp and drill jig capable of being readily arranged for accurately drilling and reaming holes in work at any point within the capacity of the lay-out plate.

With these and other objects in view, the invention consists in the construction and novel combination and arrangement of parts hereinafter fully described, illustrated in the accompanying drawings and pointed out in the claims hereto appended, it being understood that various changes in the form, proportion and minor details of construction, within the scope of the claims, may be resorted to without departing from the spirit or sacrificing any of the advantages of the invention.

Figure 1 is a plan view of a work holding clamp and drill constructed in accordance with this invention.

Fig. 2 is a side elevation of the same.

Fig. 3 is a vertical sectional view taken on the line 3-3 of Fig. 1.

Fig. 4 is a detail horizontal sectional view on the line 4-4 of Fig. 2.

Fig. 5 is a perspective view of the work holding clamp, the master drilling disk and the adjustable clamping means for holding the same being removed.

Fig. 6 is a vertical sectional view on the line 6-6 of Fig. 5.

In the accompanying drawings in which is illustrated the preferred embodiment of the invention the work holding clamp and drill jig comprises in its construction a base 1 preferably constructed of cast iron but any other suitable material may of course be employed. The said base, which is rectangular and hollow is composed of a horizontal top lay-out plate 2 and vertical sides 3 provided with longitudinal slots 4 adapted to form hand holds for enabling the device to be readily handled and carried and also to receive clamping plates 5 of adjustable clamps composed of inverted screws 6 provided at their lower ends with heads 7 and slidably mounted in undercut grooves 8 of the bed 9 of a drilling or other ma-

chine (not shown). Said base has an upper work supporting surface or upper portion that is not obstructed by any integral portion or part of the base. The screw 6 passes through the clamping plate and is provided above the same with a nut 10 for enabling the plate 5 to be adjusted vertically, a washer being preferably interposed between the plate 5 and the nut 10 as shown.

The plate 5 extends into the slot 4 and engages the bottom wall thereof for holding the base firmly upon the bed 9 in an adjusted position and the plate 5 is maintained in firm clamping engagement with the base by means of a clamp screw 11 threaded through the outer end portion of the plate 5 and having a reduced terminal portion 12 which engages the bed 9 at one side of the adjacent groove 8. The clamp screw 11 is provided at its upper end with a knurled head but any other suitable means may of course be employed for enabling the clamp screw to be adjusted.

The rectangular base is provided in the upper face of the lay-out plate 2 adjacent two of the marginal edges thereof with longitudinal recesses 13 providing grooved portions forming seats arranged at right angles to each other and receiving the lower edges of fixed work abutment and squaring bars 14 detachably secured to the base by screws 15 and 16 arranged in countersunk or counterbored openings 17 and 18 so that the heads of the screws 15 and the upper ends of the screws 16 will lie below the upper faces of the fixed bars 14. The adjacent ends of the fixed bars 14 are arranged contiguous to each other, as clearly illustrated in Figs. 1 and 5 of the drawings, and they present inner perpendicular faces 19 against which the work to be clamped and operated on, abuts. It will also be noted that the lower portion of each squaring bar 14 has a neat fit in the grooved portion to which it corresponds, or in other words in which it is placed, whereby the grooved portion affords a proper positioning of the abutment or squaring bar when it is secured in place by the holding screws 15 and 16. It will also be noted that when the squaring bars 14 are removed the top supporting surface is unobstructed, or may be made completely unobstructed, with a consequent construction that permits a member which is so long that it extends past opposite marginal edges to be clamped to, to be supported by and to be operated upon while thus on the clamping or base plate.

The lay-out plate is provided with equally spaced broadened square holes 20 which are preferably countersunk or flared at the upper face of

the lay-out plate. The broached holes are adapted to receive square posts 21 of adjustable work engaging clamps and a square shank or post 22 of an adjustable clamp for holding a master drilling disk 23. In Figs. 1 to 3 of the drawings a piece of work in the form of a rectangular plate 24 is clamped against the work abutment and squaring bars 14 and the master drilling disk is also clamped in position for guiding the drill of a drilling machine (not shown).

The post 21 is provided adjacent its upper end with an inclined threaded opening 25 in which is arranged an inclined work clamping screw 26 having a reduced engaging end 27 and adapted to engage the work at the edge thereof for firmly clamping the same against the fixed abutment and squaring bars and also for exerting a downward pressure on the work for holding the same down upon the lay-out plate. In Figs. 1 to 3, inclusive, of the drawings two adjustable clamps arranged at right angles to each other engage two of the edges of the rectangular plate 24 for holding the same against the fixed bars 14 for squaring the work and for holding the same. In Fig. 5 of the drawings the work 28, which consists of an oblong block and which is supported in an elevated position slightly above the lay-out plate by a plate 29, is clamped against the fixed bars 14 by three of the adjustable clamps, two being located at one side of the block and one of the clamps being located at one end of the block.

The plate 29 which is separate from the base and removable therefrom is simply employed for supporting the block 28 in the desired position for drilling. The screw 26 preferably has a knurled head 30 and is provided with a polygonal shaped longitudinal socket 31 extending inwardly from the end face of the head 30 and adapted to receive a wrench or tool for enabling the screw 26 to be tightened to the desired degree. The head 30 of the screw 26 is also preferably provided with a transverse opening 32 for the reception of a pin or other tool when it is more convenient for applying force to the screw 26 for operating the same.

The fixed bars 14 provide a solid abutment for the master drilling disk 23 which is provided with a tapered opening for the reception of a tapered tool steel bushing 33 which provides an opening for guiding a drill in the usual manner whereby holes may be accurately drilled in the plate 24 or other work. Suitable blocks 34 are interposed between the fixed bars 14 and the master drilling disk and are arranged at right angles as clearly illustrated in Fig. 1 of the drawings. Blocks of various sizes may of course be employed for positioning the master drilling disk for drilling a hole at any desired point within the capacity of the lay-out plate. The master drilling disk is clamped firmly in operative position by a reversible and adjustable clamping jaw 35 of approximately oblong form and preferably constructed of tool steel. The clamping body 35 is provided at its inner disk engaging end with spaced engaging portions 36 having arcuate end faces 37 for fitting against and engaging the side face or edge of the master drilling disk.

The spaced engaging portions are separated by an intervening recess 38 as clearly illustrated in Fig. 1 of the drawings. The outer end portion of the adjustable clamping jaw 35 is tapered and is provided at the outer end with upper and lower oppositely inclined faces 39, the upper one of which is adapted to be engaged by an inclined clamping screw 40 whereby the clamping jaw 35

is positively held down and securely maintained in a horizontal position upon the work and in engagement with the master drilling disk. The oppositely inclined outer end faces 39 render the clamping jaw reversible so that either of its horizontal faces may be arranged uppermost and one of the inclined faces will always be in position to be engaged by the inclined clamping screw 40.

The inclined clamping screw 40 is mounted in an inclined threaded opening 41 in a swiveled head 42 carried by the shank or post 22. The shank or post 22 is provided in its upper portions with a vertical socket 43 forming an upper tubular portion for the shank or post 22 and receiving a vertical stem 44 formed integral with and extending downwardly from the head 42. The stem 44 is provided with an annular groove 45 which is engaged by a transverse pin 46. The pin 46 pierces the upper tubular portion of the shank or post 22 and retains the stem or spindle portion 44 of the head 42 whereby the head 42 is swiveled to the shank or post 22.

The engaging end 47 of the inclined screw 40 is reduced for engaging the clamping jaw 35. Various kinds of work may be squared up and clamped in the work holding clamp for various operations and while both the work engaging clamps and the master drilling disk clamping means may be simultaneously used, as illustrated in Figs. 1 and 2 of the drawings, the work holding clamps only may be used, as illustrated in Figs. 5 and 6 of the drawings. The sides of the hollow base are of sufficient height to provide ample space within the hollow base into which the lower portions of the posts 21 and 22 may project. The flared or reamed upper ends of the broached holes in the horizontal lay-out plate of the hollow base facilitate the ready introduction of the posts 21 and 22 into the spaced holes 20.

The inner vertical faces 19 of the fixed work abutment and squaring bars 14 are arranged in parallelism with the adjacent side walls of the square openings in the lay-out plate so that the square posts of the adjustable clamps when placed in any of the holes will maintain the clamping screws directly opposite one or the other of the said bars 14 so as to positively clamp the work against accidental slipping.

What is claimed is:

1. A work holding clamp including a hollow rectangular base composed of a horizontal lay-out plate having an unobstructed flat work supporting surface and provided with spaced square openings and with recesses arranged at right angles to each other and which extend along two adjacent side portions of the lay-out plate at the marginal edges thereof, said base having vertical supporting sides that provide portions with longitudinal slots therein which in turn provide hand holds and which are also adapted to receive clamping members for securing the base to a bed of a machine, said work holding clamp also having fixed work abutments or squaring bars arranged at right angles to each other and rigidly but detachably secured in and positioned by the recessed portions of the lay-out plate, and a set of adjustable clamps each of which comprises a square post that fits the square opening of the lay-out plate and a clamping screw that is supported by the post, at least one of said adjustable clamps being constructed so that it comprises a clamping body provided with an inner disk-engaging end, a post fitted in an opening of the base and constructed so as to have a tubular upper portion, a head having a depending integral

spindle mounted in the tubular portion of the post, which spindle is provided with an annular groove, a fastening device carried by the post and engaging the grooved portion of the spindle whereby the head is swiveled to but held in position on the post and a clamping screw supported by said head and engaging the outer end of the body.

2. In a work holding clamp as defined in and by the claim preceding, a clamping body provided at its inner end with spaced faces whereby the clamping body can properly engage work pieces of different diameters and having oppositely inclined faces at its outer end, either of which is adapted to be engaged by the clamping screw corresponding thereto.

3. A work holding clamp including a hollow rectangular base composed of a top horizontal lay-out plate that provides an unobstructed upper supporting surface and of vertical sides that extend downwardly from said top plate, said vertical sides having hand openings whereby to move the device and also providing spaces to receive clamping devices whereby to secure the devices fixedly on a support, the top plate being provided with a plurality of openings, fixed work abutments or squaring bars arranged at right angles to each other and rigidly but detachably secured to the base in grooved portions of the base adjacent two of the marginal edges of the lay-out plate and within which grooved portions the lower portions of the squaring bars fit, and a plurality of adjustable clamps composed of clamping screws and posts supporting the clamping screws and fitting the openings in the lay-out plate whereby the adjustable clamps may be arranged in different positions on the lay-out plate.

4. A work holding clamp including a hollow rectangular base composed of a top horizontal lay-out plate that provides an unobstructed upper supporting surface and of vertical sides that extend downwardly from said top plate, said vertical sides having hand openings whereby to move the device and also providing spaces to receive clamping devices whereby to secure the device fixedly on a support, the top plate being provided with a plurality of openings, fixed work abutments or squaring bars arranged at right angles to each other and rigidly but detachably secured to the base in grooved portions of the base adjacent two of the marginal edges of the lay-out plate and within which grooved portions the lower portions of the squaring bars fit, and a plurality of adjustable clamps composed of clamping screws and posts supporting the clamping screws and fitting the openings in the lay-out plate whereby the adjustable clamps may be arranged in different positions on the lay-out plate, said posts being slidable in any one of said openings and said clamping screws being arranged upon a downward inclination with relation to said posts and the lay-out plate whereby when said clamping screws are engaged tightly with the work the posts will bind against opposite side walls of said vertical openings at the ends of the latter and thereby be held against vertical movement by the downward thrust of the screws and the work thereby maintained against upward or other displacement.

5. A work holding device including a hollow, rectangular shaped base composed of a top horizontal lay-out plate and depending vertical sides which support the lay-out plate in elevated position, squaring bars arranged at right angles to each other and extending along adjacent sides

of the lay-out plate and presenting inner vertical abutment faces arranged at right angles to each other, said plate having a plurality of vertical openings extending therethrough and which openings are rectangular in cross section, and adjustable clamps each of which comprises a post which is rectangular in cross section and slidable in any one of said openings and a clamping screw operating through a threaded opening in the upper end of the respective post, each of said first mentioned openings being flared at its upper end to facilitate insertion of the respective posts in such openings and the sides of said rectangular openings being disposed in parallelism with one or the other of said right angularly disposed squaring bars so that the posts of said adjustable clamps when placed in said openings will maintain the clamping screws parallel with one or the other of the said bars so as to positively clamp the work against accidental slipping, said depending sides of said hollow base having openings therein to provide hand-holds for readily removing the device from one place to another or to receive elements of suitable clamping means for holding the device against movement on a support.

6. A work holding device including a hollow, rectangular shaped base which is composed of a top horizontal lay-out plate and depending vertical sides which support the lay-out plate in elevated position, fixed work squaring bars arranged at right angles to each other and extending along adjacent sides of the lay-out plate and presenting inner vertical abutment faces arranged at right angles to each other, said plate having a plurality of vertical openings extending therethrough and which openings are rectangular in cross section and adjustable clamps each of which comprises a post which is rectangular in cross section, and a clamping screw operating through a threaded opening in the upper end of the respective posts, the sides of said rectangular openings being disposed in parallelism with one or the other of said right angularly disposed squaring bars so that the posts of said adjustable clamps when placed in said openings will maintain the clamping screws parallel with one or the other of said bars so as to positively clamp the work against accidental slipping, said posts being slidable in any one of said openings interchangeably and said clamping screws being arranged upon an incline with relation to said posts and said lay-out plate whereby when said clamping screws are engaged tightly with the work the posts will bind against opposite side walls of said vertical openings at the ends of the latter and the posts thereby held positively against vertical movement by reason of the downward thrust of the screws and the work maintained against upward or other displacement.

7. A work holding device including a hollow, rectangular shaped base which is composed of a top horizontal lay-out plate and depending vertical sides which support the lay-out plate in elevated position, fixed work squaring bars arranged at right angles to each other and extending along adjacent sides of the lay-out plate and presenting inner vertical abutment faces arranged at right angles to each other, said plate having a plurality of vertical openings extending therethrough and which openings are rectangular in cross section and adjustable clamps each of which comprises a post which is rectangular in cross section, and a clamping screw operating through a threaded opening in the upper end of

the respective posts, the sides of said rectangular openings being disposed in parallelism with one or the other of said right angularly disposed squaring bars so that the posts of said adjustable	vertical openings at the ends of the latter and the posts thereby held positively against vertical movement by reason of the downward thrust of the screws and the work maintained against upward or other displacement, said vertical openings being flared at their upper ends to facilitate insertion of said posts in said openings and the vertical sides of the base having openings therein whereby to provide hand holds for moving the device from one place to another or to receive elements of a clamping means whereby to clamp the base immovably on a support.	80
5 clamps when placed in said openings will maintain the clamping screws parallel with one or the other of said bars so as to positively clamp the work against accidental slipping, said posts being		
10 slidable in any one of said openings interchangeably and said clamping screws being arranged upon an incline with relation to said posts and said lay-out plate whereby when said clamping screws are engaged tightly with the work the posts will bind against opposite side walls of said		85
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