Sept. 17, 1946. J. F. ANDERSON 2,407,769

DRILLING VISE

Filed Nov. 16, 1943 3 Sheets-Sheet 1

Fig. 1.

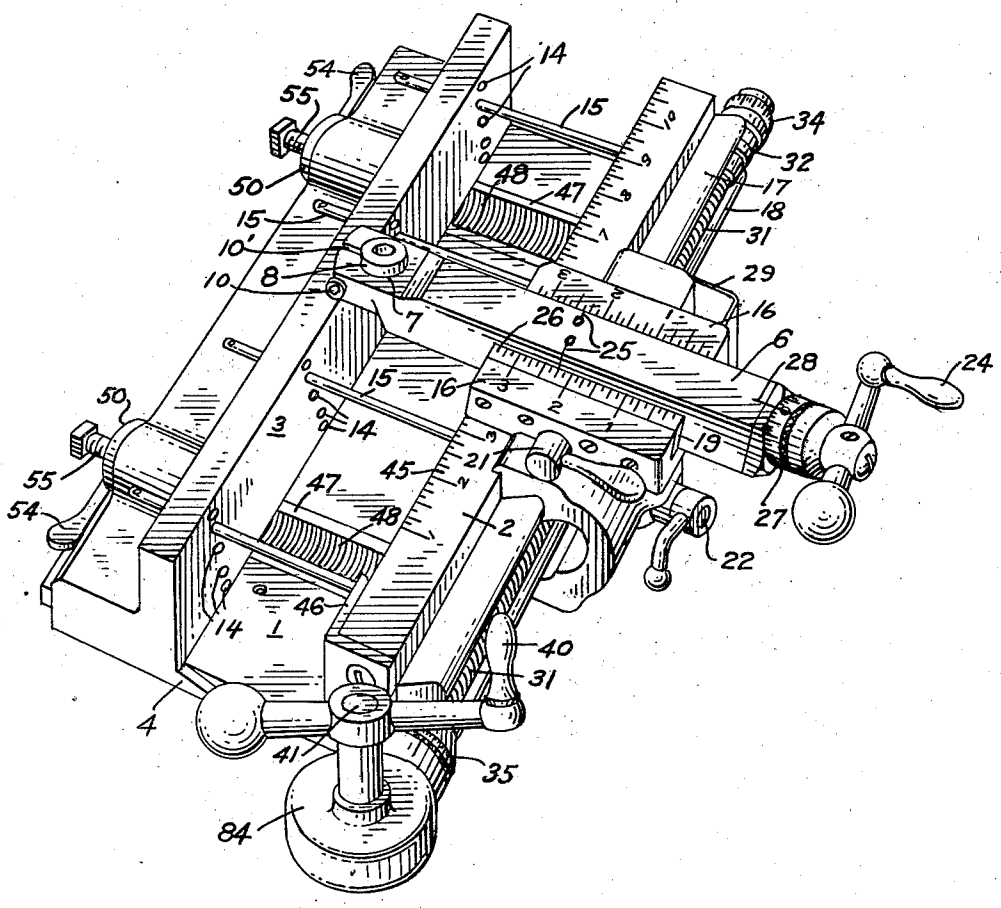
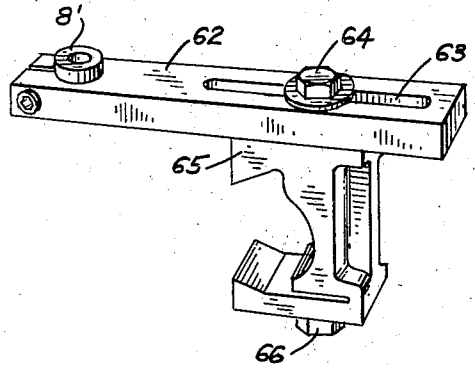


Fig. 7.



INVENTOR
JOHN F. ANDERSON
BY
ATTORNEY.

Sept. 17, 1946. J. F. ANDERSON 2,407,769

DRILLING VISE

Filed Nov. 16, 1943 3 Sheets-Sheet 2

Fig. 2.

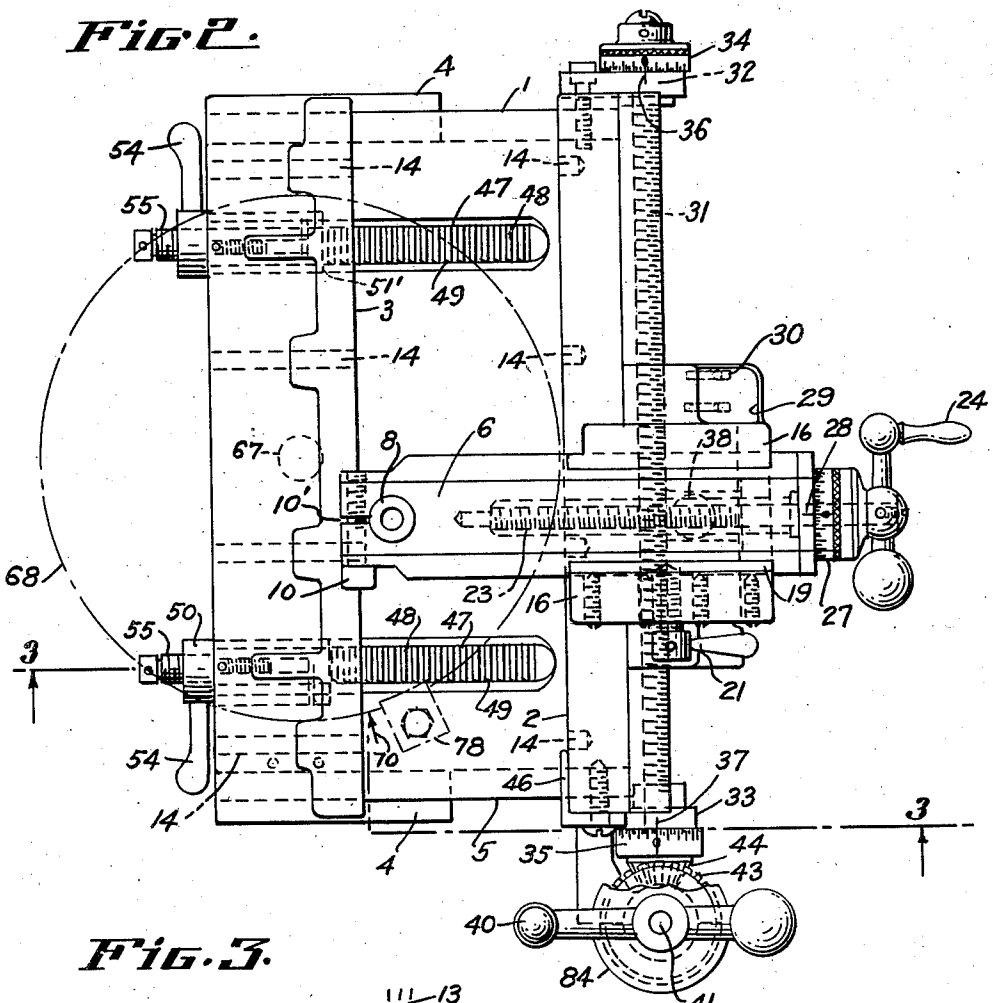
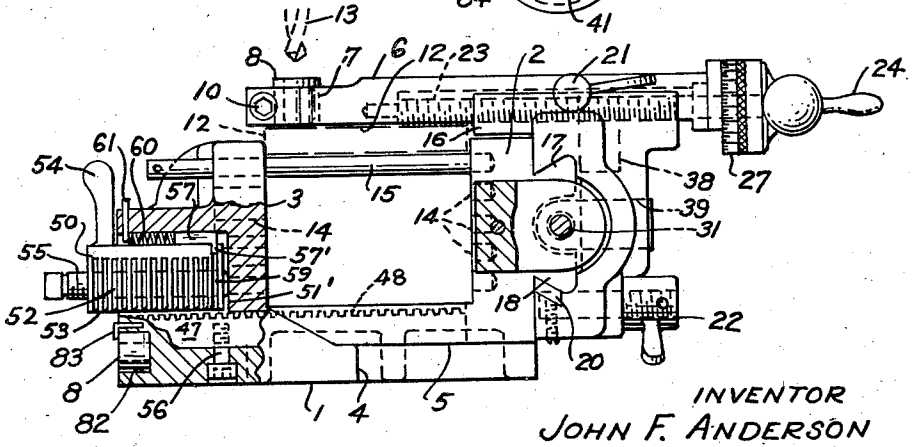


Fig. 3.



INVENTOR
JOHN F. ANDERSON
BY J. C. Vreid
ATTORNEY.

Sept. 17, 1946. J. F. ANDERSON 2,407,769

DRILLING VISE

Filed Nov. 16, 1943 3 Sheets-Sheet 3

Fig. 4.

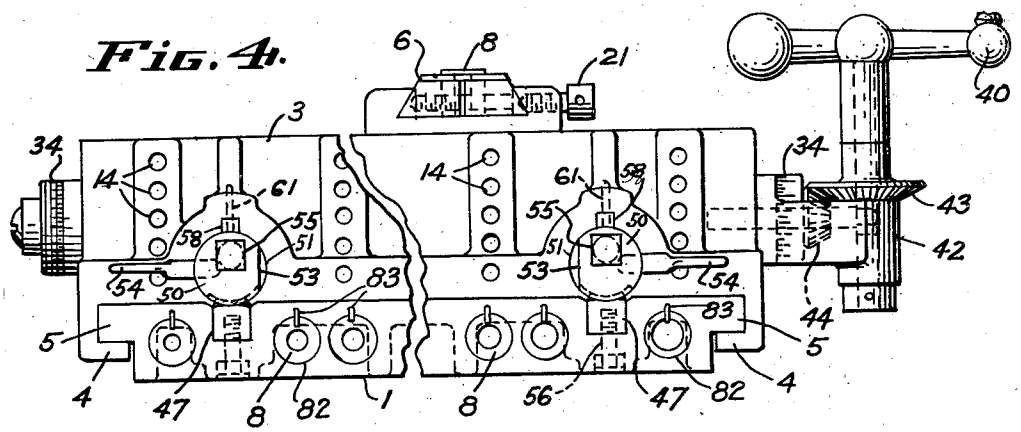


Fig. 5.

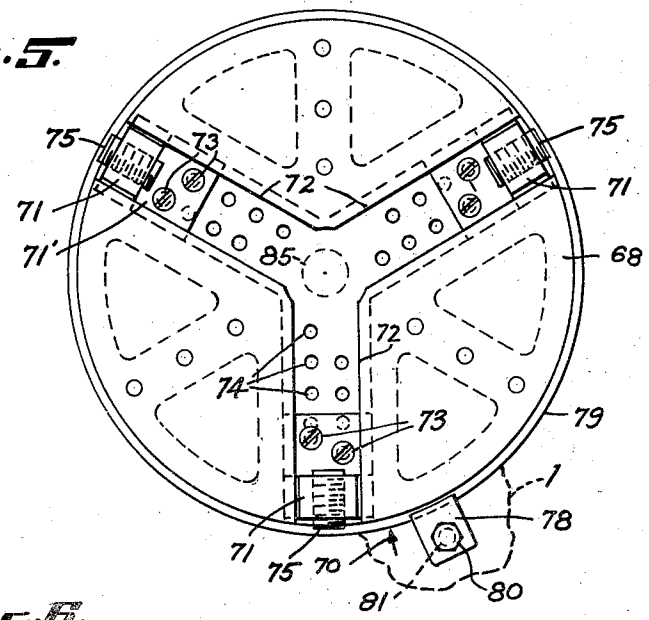
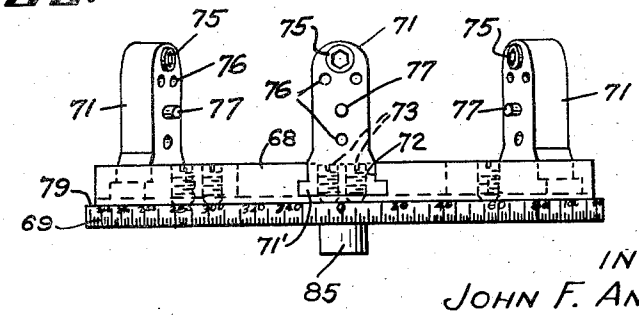


Fig. 6.



INVENTOR
JOHN F. ANDERSON
BY A. C. Bruce
ATTORNEY.

Patented Sept. 17, 1946

2,407,769

UNITED STATES PATENT OFFICE

2,407,769

DRILLING VISE

John F. Anderson, Oakland, Calif.

Application November 16, 1943, Serial No. 510,519

11 Claims. (Cl. 77—62)

1

This invention relates to machine shop devices to facilitate the drilling of holes in definite places in various pieces of work, and generally termed "drilling vises" or "drilling jigs," and which devices are adapted to clamp or otherwise hold the work in place while it is being drilled.

The object of the invention is to provide an improved drilling vise of this character which will expedite the accurate locating of holes to be drilled into the work. Specific features and advantages of the invention will appear in the following description and accompanying drawings.

In the drawings:

Fig. 1 is a perspective view showing the general appearance of my improved drilling vise.

Fig. 2 is a plan view of the device.

Fig. 3 is an end view of the device taken from the line 3—3 of Fig. 2.

Fig. 4 is a broken rear elevation of the device and shows the rack-bar clamps which hold the slidable jaw clamped against the work.

Fig. 5 is a plan view of a revolvable table attachment.

Fig. 6 is a fragmentary elevation of one of the revolvable tables, showing its work holding jaws.

Fig. 7 is a perspective view of an attachment drill bushing arm, which cooperates with the main drill bushing arm when desired to drill more than one hole in the work, at one setting.

Before describing the drawings in detail, the invention may be generally described as a flat base plate with a pair of vise jaws projecting upwardly therefrom and between which the work is clamped while an adjustable arm carrying a drill guiding hole or bushing overlies the work and by means of cross feeds may quickly be brought with great accuracy to any precise point over the work where a hole is desired to be drilled. Certain attachments provide for drilling a plurality of accurately located holes in repetition work, also circular rows of holes.

In the drawings 1 is the flat base plate adapted to be placed on and moved about the table of a drill press, and which base plate is provided with a fixed upstanding wall or jaw 2 extending along its forward edge, and a cooperating but slidably arranged similar rear wall or jaw 3 which is provided with transversely extending guides 4 at opposite ends engaging suitably rabbeted end edges 5 of the base plate so that the rear jaw can approach the fixed front jaw to grip or clamp any desired block, rod, bar, or other shaped piece of "work" between the jaws as in a vise, with the work positioned under the drill locating arm 6 which projects transversely across

2

the front wall and may be adjusted to any position.

The drill locating arm 6 has a vertically disposed hole 7 at its end overhanging the work in which is positioned a drill guiding bushing 8 (generally of hardened steel) and which is clamped in place as by a screw 10 passing laterally through the extreme end of the arm which is split as at 10' to make it compressible against the bushing. The drill bushing is interchangeable with others for every size drill used, but all having the same outer diameter, tho very small ones may of course fit into the bores of the larger ones if desired.

A piece of "work" in the form of a block is shown clamped in position between the jaws 2 and 3 in Fig. 3 in dotted lines 12 and with a drill dotted at 13 in position just over the bushing 8, while to support the work up as close as possible to the bushing the clamping jaws 2 and 3 are provided with several vertical and horizontal rows of confronting aligned horizontally extending holes 14 into which loose rods 15 are freely slidable and upon which the work rests. The work may be blocked up with shims or filler plates where its thickness or peculiar form may so require.

Arm 6 is mounted for longitudinal sliding movement in a carriage 16 which in turn is slidably mounted on suitable guides 17, 18 formed on or secured to the front jaw 2, for slidable movement along the front jaw at right angles to the movement of the arm 6 on the carriage so that the drill bushing can readily be brought to any desired point over the work from end to end of the clamping jaws or breadth of the base plate.

The two sliding members 6 and 16 are preferably adjustably gibbed to their guides respectively as at 19 and 20 to take up all slack, and the arm 6 may be locked to carriage 16 as by a screw 21, and the carriage locked to its guides as by a screw 22, working on the gib plates. Arm 6 is moved back and forth by a hand screw 23 operated by a handle 24 like a lathe tool carriage and the arm carries a pointer mark 25 on both edges moving along graduated scales 26 formed on the confronting guide edges of the carriage, while the hub of the handle carries a frictionally circumferentially adjustable graduated ring 27 cooperating with a pointer mark 28 on the end of the arm 6 for fine adjustment of the drill bushing to precise position. Such construction consists essentially of rotatably mounting the graduated ring on a turned down portion of the hub and suitably retarding its free rotation as by the

interposition of friction material and/or by suitable spring pressure.

Preferably the carriage is provided with a pocket 29 for carrying sundry wrench rods 30 to fit the various clamping and adjusting screws of the device.

Carriage 16 is moved in either direction along its guides by a lead screw 31 extending the length of the base plate and supported in end bearings 32, 33 like a lathe lead screw, except that preferably both ends are fitted with a graduated ring 34, 35 reading against pointer marks 36, 37 on the bearings. Preferably the graduated rings are frictionally adjustable so they can be manually turned to set their zeros against the fixed pointers whenever desired.

The arm moving screw 23 engages threads in a plug 38 inserted in the carriage, and the carriage lead screw 31 engages threads in a plug 39 inserted in the carriage.

The carriage lead screw is operated by a handle 40 secured to a short vertical shaft 41 mounted in a bearing member 42 projecting from the near end of front wall or jaw, and which shaft carries a relatively large bevel gear 43 meshing with a bevel pinion 44 of half its diameter secured to the projecting end of the lead screw so that each turn of the handle will equal two turns of the screw for simplifying computations as to the distance of travel of the carriage, as the screw is preferably ⅛ inch pitch and the travel therefore is one-quarter inch.

The pitch of the cross feed or arm screw 23 is similarly of some aliquot portion of an inch and matching or divisible into the carriage cross graduations 26. Also, there is preferably a graduated scale 45 formed along the edge of the front jaw 2 which may be read against a pointer line preferably located on the far edge of the carriage and which will register with the first line of the scale 45 when the center of the drill bushing carried by arm 6 is in line with the edge of a reversible stop 46 on the front jaw against which the work may be abutted, and which is one inch from the first graduation of the scale which is accordingly designated 1."

By the graduated scales and fine reading disks or rings and relation of threads above described, it will be seen that the bushing or drill center may be quickly brought to any precise point over the work with relation to any line along scale 45 or from the end of the work against stop 46 with great accuracy.

Instead of providing the conventional vise screws for clamping jaws 2 and 3 against the work, I obtain greater clearance for the work by providing a pair of spaced rack bars 47 formed in or secured in recesses in the base plate 1 as by screws 56, and which rack bars have rack teeth 48 extending straight across the bars, beveled at one end as at 49, and concaved on top to each match the curve of a short round rack plug 50 mounted to rotate in a round recess 51 in the rear jaw 3 and formed with a circular rack 52 over portion of its circumference only and with an adjacent flat side 53, so that when the plugs are turned with their flat sides over their respective rack bars they will be free of contact with the bars and the rear jaw 2 may therefore be pushed back and forth along the base plate or snugly against the work to be clamped in place, and when the plugs are then given a quarter turn as by their handles 54 the teeth of the plugs (being similarly beveled at the ends) will engage the teeth of the rack bars to lock the plugs against relative longitudinal movement, and after which the rear jaw is forced forward into tighter clamping position by pressure screws 55 which are threaded longitudinally entirely through the plugs to bear at their inner ends against the closed inner ends 51' of recesses 51.

The plugs 50 extend rearwardly from the rear jaw and are kept from coming out when disengaged from the rack bars, as by a small keeper 57 slidably seated in a groove 58 and formed with a hooked end 57' engaging a circular groove 59 formed in the plug, and the keeper resiliently forced forward by a small coiled compression spring 60 lying in groove 58 and reacting against a stop pin 61. This construction permits backing up of the plugs relative to the rear jaw 3 when the pressure screws 55 are applied, while insuring the plugs being resiliently urged inwardly in their recesses when not under pressure.

In case it is desired to locate two or more holes for drilling the work, one or more auxiliary bushing arms may be used and simply clamped rigidly to the carriage guides 17, 18 spaced from or adjacent either end of the carriage. Such an auxiliary arm is shown in Fig. 7 at 62 with a drill bushing 8' at one end, and the other end slotted at 63 and bolted as at 64 to a block 65 formed to fit over the guides 17, 18 and clamped at any place therealong as by a screw 66. Several of these may be used at once if desired and the extending arm may be made of any shape desired to reach the spot where the hole is to be drilled. Such auxiliary arms must of course be adjusted by measurement and then clamped in place.

For the drilling of circular rows of holes I provide the attachment shown in Figs. 5 and 6 and which is used after removing the rear jaw 3 from the base plate and which exposes a round hole 67 drilled in the top of the plate to receive a pin 85 which projects centrally below a round plate or disk 68 bearing a circular scale 69 about its lower edge for reading against a suitable mark 70 formed on the base plate, while projecting upward from the top of the disk 68 are several lugs or jaws 71 slidably mounted in radial guiding grooves 72 adapted to be moved toward the center of the disk to embrace and hold various shaped work pieces which it is desired to drill.

These jaws are each provided with a foot portion 71' fitted with two base screws 73 adapted to respectively screw into rows of staggered tapered holes 74 in the disk so that the jaws can be firmly secured at various positions along the guides 72 to approximately suit the piece of work to be held, and after which pressure screws 75 projecting radially through the upper ends of the jaws may be operated to tightly impinge the work and hold it immovable.

The work may be supported directly upon the disk, or blocked up as may be required, but to facilitate holding the work at the desired elevation, I provide several holes 76 through each jaw fitted with loose pins 77 which may be pulled out or inserted into any of the holes to project inward for supporting the work when held between the jaws.

In use, the disk is revolved to bring the work under the overhanging drill bushing arm 6 as required, and to prevent the disk from revolving during the drilling operation a suitable clamping plate 78 which overlaps a shoulder 79 formed around the edge of the disk, is tightened down against the base plate as by screw 80 which screws into tapped holes 81 provided in the base plate.

With the use of the disk it is manifest that circular rows of holes may be drilled into the work held on the disk by the jaws 71 and accurately spaced radially by slidably adjusting the drill bushing arm 6, or spaced circularly by turning the disk to the next desired graduation along the scale 69.

Since in use, many different size drill bushings are required I therefore preferably provide pockets or recesses throughout the structure wherever practicable to receive them when not in place on the arm 6 and some such bushing recesses are indicated along the rear edge of the base plate by the dotted lines 82 and with any suitable retainer to keep them from falling out, such as a wire latch 83.

It may be mentioned that in Fig. 1 the large bevel gear 43 is shown covered by a sheet metal inverted cup 84, but which is broken away in Fig. 2 to expose the gear below.

Having thus described my improved drilling vise and progressively explained its manner of use, what I claim is:

1. In a drilling vise of the character described, a pair of cooperating relatively movable elongated jaws for clamping between them the work to be drilled, a carriage mounted on and to slide along one of the jaws and provided with a drill socket carrying arm slidably mounted and adapted to project across the work clamped between the jaws, means for moving said carriage longitudinally of the jaws, and means for moving said arm to any desired degree of projection over the work transversely of the carriage movement, and graduated scale means extending along the jaw upon which the carriage is mounted and extending along the arm mounting reading for both directions of movement arranged for predetermining the location of the drilling center from a fixed stop on the jaw along which the carriage is slidable.

2. In a drilling vise of the character described, a base plate, a pair of cooperating elongated vise jaws carried by said base plate, one of said jaws fixed to said plate and the other mounted thereon to move transversely of the length of the jaws for clamping between them the work to be drilled, means for operating the movable jaws, a carriage mounted on and to slide along the fixed jaw, and the fixed jaw and carriage provided with interengaging guiding surfaces holding the carriage to the jaw, and the carriage provided with a drill socket carrying arm adapted to project across the work clamped between the jaws, screw means arranged for moving said carriage longitudinally of the fixed jaw, and screw means arranged for moving said arm to any desired degree of projection over the work transversely of the carriage movement.

3. In a drilling vise of the character described, a pair of cooperating relatively movable elongated jaws for clamping between them the work to be drilled, a carriage mounted on and to slide along one of the jaws and provided with a drill socket carrying arm adapted to project across the work clamped between the jaws, means for moving said carriage longitudinally of the jaws, and means for moving said arm to any desired degree of projection over the work transversely of the carriage movement, stop means on one of the jaws against which the work is adapted to be abutted, and graduated scale means reading along both directions of movement arranged for predetermining the location of the drilling center from said stop means.

4. In a drilling vise of the character described, a flat base plate, a fixed standing wall along one edge of the plate forming a front jaw, a cooperating rear jaw in confronting relation to said front jaw slidably mounted on said plate, means for clamping the jaws against a piece of work to be drilled, a carriage slidably mounted to move along the fixed wall, an arm carried by said carriage and slidably mounted thereon to project one end to any desired degree over the work clamped between the jaws, and a drill socket carried by the projecting end of the arm, a bracket formed for clamping to the fixed wall, and a drill socket arm adjustably secured to said bracket for extending over said work.

5. In a drilling vise of the character described, a flat base plate, a fixed standing wall along one edge of the plate forming a front jaw, a cooperating rear jaw in confronting relation to said front jaw slidably mounted on said plate, means for clamping the jaws against a piece of work to be drilled, a carriage slidably mounted to move along the fixed wall, an arm carried by said carriage and slidably mounted thereon to project one end to any desired degree over the work clamped between the jaws, and a drill socket carried by the projecting end of the arm, said drill socket comprising a drill guiding bushing projecting into a hole in the arm, and said arm being split adjacent said hole to make it compressible, and means for compressing the arm to tightly engage said bushing.

6. In a drilling vise of the character described, a flat base plate, a fixed standing wall along one edge of the plate forming a front jaw, a cooperating rear jaw in confronting relation to said front jaw slidably mounted on said plate, means for clampinlg the jaws against a piece of work to be drilled, a carriage slidably mounted to move along the fixed wall, an arm carried by said carriage and slidably mounted thereon to project one end to any desired degree over the work clamped between the jaws, and a drill guiding bushing carried by the projecting end of the arm, and a plurality of bushing receiving pockets formed in the structure of the drilling vise.

7. In a drilling vise of the character described, a flat base plate, a fixed standing wall along one edge of the plate forming a front jaw, a cooperating rear jaw in confronting relation to said front jaw slidably mounted on said plate, means for clamping the jaws against a piece of work to be drilled, a carriage slidably mounted to move along the fixed wall, an arm carried by said carriage and slidably mounted thereon to project one end to any desired degree over the work clamped between the jaws, and a drill guiding bushing carried by the projecting end of the arm, and a plurality of bushing receiving pockets formed in the structure of the drilling vise, and also a larger pocket to receive wrenches required for said vise.

8. In a drilling vise of the character described, a flat base plate, a fixed standing wall along one edge of the plate forming a front jaw, a cooperating rear jaw in confronting relation to said front jaw slidably mounted on said plate, means for clamping the jaws against a piece of work to be drilled, a carriage slidably mounted to move along the fixed wall, an arm carried by said carriage and slidably mounted thereon to project one end to any desired degree over the work clamped between the jaws, and a drill socket carried by the projecting end of the arm, said rear jaw being detachable from said base plate, a pivot hole formed in said plate and a rotary work holder

arranged to be pivoted over said pivot hole in a manner to permit the work to be rotated beneath said arm.

9. In a structure as set out in claim 8, said rotary work holder comprising a disk with a circular graduated scale along its edge reading against a pointer on said base plate, a plurality of standing jaws on said disk, means mounting said jaws for radial movement to grip the work between them, means for supporting the work at various definite spaced points of elevation between the jaws, and means for clamping the disk against rotation.

10. In a drilling vise of the character described, a flat base plate, a fixed standing wall forming a front jaw along one edge of the plate, a relatively movable wall forming a cooperating rear jaw adapted for clamping the work against the front jaw, rack teeth secured to the base plate, means carried by the rear jaws for engaging and disengaging the rack teeth comprising a circular plug revolvably mounted in the rear jaw and having teeth formed on a portion of its diameter to engage the rack teeth when the plug is revolved a fractional turn, and a cut-away portion to clear the rack teeth at another point of revolution, means on said plug adapted for manually turning

the plug, and a pressure screw passing longitudinally through the plug in a manner to bear against a portion of said rear jaw for forcing the jaw toward the work when the plug teeth and rack teeth are engaged.

11. In a drilling vise of the character described, a flat base plate, a fixed standing wall forming a front jaw along one edge of the plate, a relatively movable wall forming a cooperating rear jaw adapted for clamping the work against the front jaw, rack teeth secured to the base plate, and means carried by and movable back and forth as a unit with the rear jaw arranged for engaging and disengaging said rack teeth for locking the rear jaw at various points of advancement toward the front jaw, and screw means arranged for giving final pressure movement to said rear jaw for so clamping the work, and means carried by the rear jaw for engaging the rack teeth comprising a circular plug revolvably mounted in the rear jaw and having teeth formed on a portion of its diameter to engage the rack teeth when the plug is revolved a fractional turn, and a cut-away portion to clear the rack teeth at another point of revolution, and means on said plug adapted for manually turning the plug.

JOHN F. ANDERSON.