

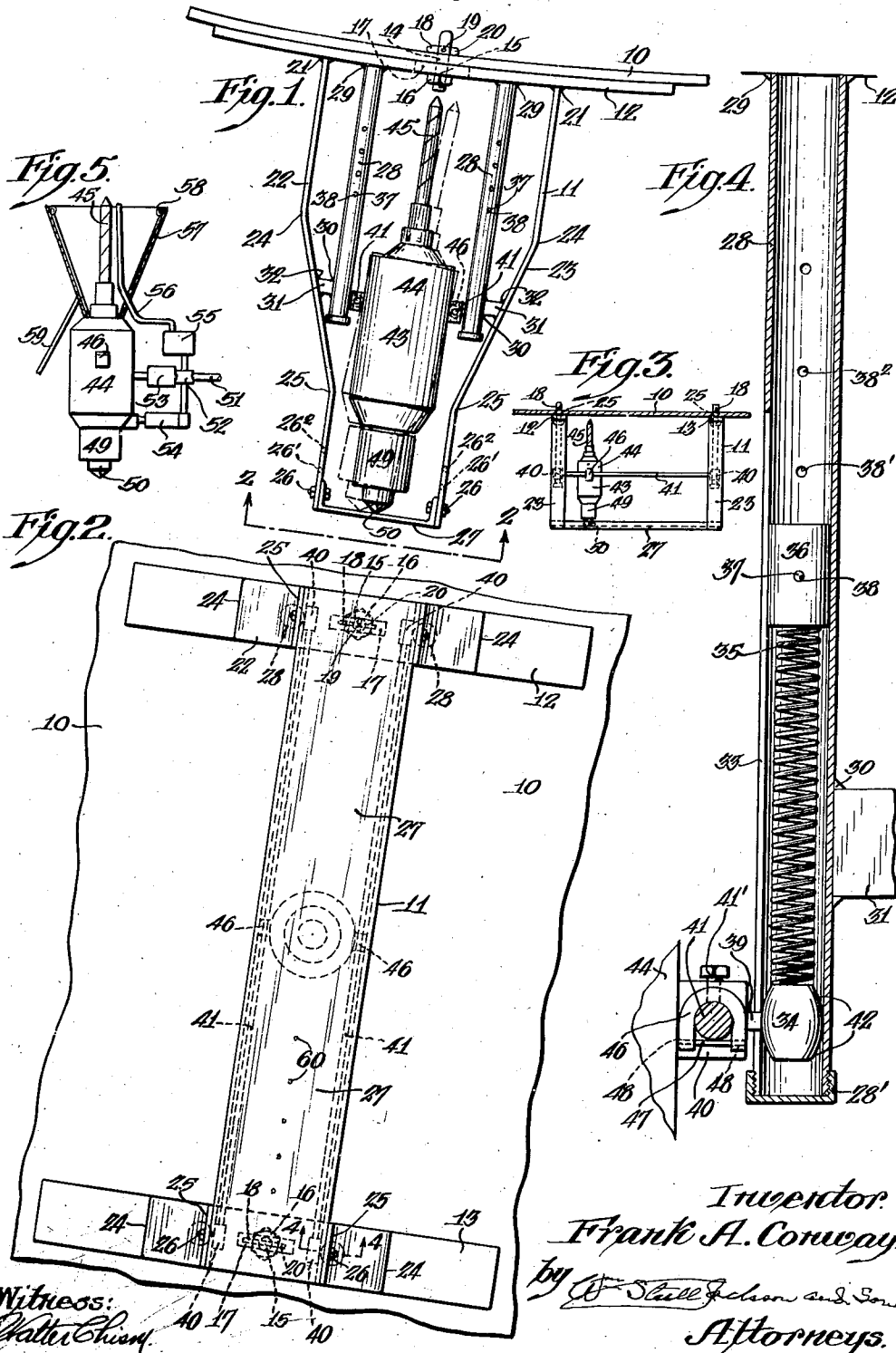
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DRILL FIXTURE

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DRILL FIXTURE

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6 Claims. (Cl. 77-13)

My invention relates to drill frames or riggings of the type which are readily portable and well suited for use in drilling parts of large structures such as ships.

A purpose of my invention is to produce a drill frame in which the drill is readily adjustable longitudinally of the row of holes being drilled, and is also readily tilted laterally in the frame at any point of longitudinal adjustment.

A further purpose is to make the drill frame itself laterally adjustable by slots and to provide for longitudinal adjustment of the drill in the frame.

A further purpose is to control the feed of a drill in a drill frame by a fluid jack.

A further purpose is to position a fluid jack on the back of and axially parallel with a drill, and to longitudinally adjust or angularly rock the jack and drill assembly while supporting the back of the jack in any adjusted or rocked position by a back plate on a drill frame, for the purpose of applying feeding pressure on the drill.

A further purpose is to support a drill, reamer or countersink, hereinafter called "drill," in longitudinally adjustable position on rails resiliently urged away from the work and pressed toward the work by the drill.

A further purpose is to mount a lubricant spray on the drill frame to lubricate the point of the drill.

Further purposes appear in the specification and in the claims.

In the drawing I have illustrated one only of the numerous embodiments of the invention, the form shown being chosen from the standpoints of convenience in illustration and satisfactory embodiment of the principles involved.

Figure 1 is a section of the work showing the drill frame in end elevation.

Figure 2 is a bottom plan view of Figure 1 on the line 2-2 thereof.

Figure 3 is a fragmentary side elevation of the structure of Figures 1 and 2 to reduced scale.

Figure 4 is an enlarged section of one of the column supports, the section being on the line 4-4 of Figure 2.

Figure 5 is a side view of the drill and jack, showing the fluid connections and lubricant system.

In the drawing, like numerals refer to like parts.

In the past, drill frames have been developed, but they have usually been so complicated and heavy, and so difficult to use, that to the present day, most drilling of ship plates and the like has

been done with support of the drill by the body, or by a "dead man" supported by the body, of the driller or his helper. Particularly in the case of drilling bottom or side plates of ships, such technique presents several difficulties. It is usually necessary to employ one man to hold the drill and another to operate the "dead man." The work is very fatiguing, particularly when drilling above the heads of the workers. Regulation of pressure on the drill presents a problem, and the driller often uses too much or too little pressure. In shifting position for comfort, the driller frequently gets the drill out of line, and broken drills commonly result.

By using the drill frame of the invention, it is possible to operate with one man once the drill frame is in place. Fatigue is reduced. Great uniformity of feed is rendered possible and the likelihood of broken drills is reduced. In all, greater speed in the work and greater certainty are obtained.

As shown in Figures 1 and 2, the plate or plates of the ship to be drilled is shown at 10, here a bottom plate. The drill frame 11 is supported on base plates 12 and 13 suitably conforming in curvature to the plate 10 as shown. To secure the base plates in position, suitable pilot holes 14 are drilled in any suitable manner through the plate 10, and bolts 15 having nuts 16 are fastened through lateral slots 17 in the base plates. As the inner ends of the bolts may not be accessible, toggle bolts will preferably be used having toggle arms 18 pivoted at 19 in slots of the bolts (as well known) and swinging from a longitudinal position used during insertion to the transverse position shown, which is assumed after insertion by the heavier end 20 swinging down.

Suitably united to the base plates, as by welding at 21, are arms 22 and 23, bent at 24 and 25, and fastened through holes 26, 26', 26" to a back plate 27, desirably of channel form, which extends longitudinally from end to end of the drill frame. The additional holes are for adjustment of the position of the back plate.

Extending transversely of each base plate on the inside of each arm 22 or 23 is a spring guide 28, suitably united to the base plate as by welding at 29, and suitably united near the outer end to one of the arms 22 or 23, as by welding at 30 to a bracket 31 welded at 32 to one of the arms.

Each spring guide 28 is slotted at 33 toward the center of the drill frame to permit movement of a rider 34 longitudinally of the spring guide against the action of a spring 35. The bottom

of the spring rests on an abutment 36 positioned by a pin 37 in a hole 38. Alternate holes to permit adjustment of the spring abutment are shown at 38', 38'', etc. Caps 28' close the spring guides.

The rider 34 carries a bracket 39 which supports a head block 40 in which rests one end of one of the drill rails 41. It is held in place in the block by set screw 41'. The rider 34 is designed to permit movement of one rail nearer the work than the other rail without possibility of jamming in the spring guide. To this end, the rider is curved at 42 to provide clearance and free movement notwithstanding that the rider is canted to one side.

On the rails is supported a drill assembly 43, desirably consisting of a pneumatic or other fluid operated drill 44 having a bit 45. Lugs 46, suitably of U-form, extend from either side of the drill and ride the rails 41. Pins 47 extend through openings 48 in the lugs to hold the drill on the rails.

On the end of the drill remote from the bit, a fluid jack 49 (preferably pneumatic) is mounted, with the end of its ram 50 bearing on the inside of the back plate 27.

Fluid connection to the mechanism is shown at 51, branching at 52 to supply the drill through a handle type valve 53, as now commonly used, and to supply the jack through a handle type valve 54. The jack may be a jam riveter or holder-on as now used in riveting.

A further fluid branch desirably connects to a lubricant spray 55, suitably of the De Vilbiss type, which sprays through a tube 56 to a point near the end of the bit (Figure 5). For drilling above the head, a catch basin 57 is provided, suitably of canvas, on a frame 58, suitably of metal strip, with a discharge tube 59 to a reservoir, not shown.

In operation, the holes for the mounting bolts will first be drilled, and the mounting bolts placed and fastened through the slots in the base plates of the drill frame. The frame will then be laterally adjusted by sliding the slotted base plates over the bolts, until the frame extends approximately true with respect to the center punch marks or other indications for the line of holes to be drilled. The bolts will then be tightened to hold the drill frame firmly against the works 10.

With fluid pressure on the jack cut off, the drill will then be moved longitudinally of the rails by sliding the lugs along the rails until the drill is longitudinally in line for the first hole. At this time the rails will be relatively far removed from the base plates and the drill bit will not be pressed against the work because of the action of the springs. The drill will next be adjusted as to angular lateral position by moving the end of the ram of the jack to one side or the other with respect to the center of the back plate. Normally the drill will be centered as shown in full line in Figure 1, but sometimes it may be necessary to move it to a canted position as shown in dot and dash lines in this figure. It is very desirable to be able to make slight adjustments by canting, without the necessity of shifting the entire frame laterally by moving the slotted base plates with respect to the bolts. When the drill is thus canted, one pair of riders are farther advanced in their spring guides than the other pair, and one rail is more advanced than the other, but the riders do not bind as they are designed to permit this.

To advance the drill against the work, now that it is fully aligned, the valve on the fluid jack is slightly opened, and the valve on the

drill is opened to start the drill. At the same time, the spray of lubricant is started by opening its valve, not shown. As the drilling progresses, the rails move toward the work and the springs are further compressed, but the position of contact of the ram of the jack and the back plate is not changed while drilling a particular hole. Thus the danger of breakage of drills is reduced, while high pressure (rapid feed) may be used by relatively wide opening of the valve on the jack.

The danger of breakage is further reduced because of the fact that feeding is accomplished by pressure overcoming both the spring retardation and the reaction of the metal which is being cut. The reaction of the metal cut is therefore a part only of the pressure met; and when the drill goes through the metal the tendency of the drill suddenly to be forced forward by the full pressure of the feed is reduced since the resistance of the spring is still effective.

When drilling of one hole is finished, the fluid is cut off from the jack and the springs are allowed to return the drill to its inoperative position. The drill can then be moved along the rails and the procedure be repeated at another spot in drilling a further hole. A line of holes is shown at 60 in Figure 2.

In view of my invention and disclosure variations and modifications to meet individual whim or particular need will doubtless become evident to others skilled in the art, to obtain all or part of the benefits of my invention without copying the structure shown, and I, therefore, claim all such in so far as they fall within the reasonable spirit and scope of my invention.

Having thus described my invention what I claim as new and desire to secure by Letters Patent is:

1. A drill frame including a drill, and having a back plate, structure supporting the back plate from the work, spring guides generally parallel with the drill and generally on either side of the drill position, springs in the guides, and riders urged by the springs away from the object to be drilled and carrying the drill, the drill being adapted to be canted by canting the riders, with support of the back of the drill from the back plate in canted position.

2. In a drill frame having a drill, a pair of longitudinally extending spaced rails, independent resilient supports for the two rails at adjacent rail ends, one for each of the separate ends of the rails urging the rails away from the work, while permitting slight movement of one rail end independently of the adjacent rail end and thus one rail more than another, means for supporting the drill in slidable position on the rails, and means for feeding the drill in any position to which it has been slid.

3. In a drill frame, spaced base plates having transverse slots, a back plate extending longitudinally of the frame removed from the base plates, arms extending from each end of each base plate to the back plate, a drill support, a drill, means for longitudinally adjusting the drill in the frame, comprising a hollow spring guide, a spring and abutment therefor slidable in the guide, means for positioning the abutment at any one of variant positions in the guide, a rider carried by the spring and connections between the rider and the drill, bolt means extending through the slots and permitting transverse adjustment of the frame and fluid jack means feeding the drill from the back plate.

4. In a drill frame, spaced base plates, a back plate longitudinal of the frame, structural means for uniting the base plates to the back plate, slotted spring guides, one on each side of each base plate, extending transversely thereto toward the back plate, riders in the slots of the spring guides, rails supported from each pair of riders and extending from one end to the other of the frame, means for supporting a drill slidably on the rails and fluid pressure means for feeding the drill, acting against the back plate.

5. In a drill frame, a drill support comprising independent supporting members having adjacent separate ends, means for resiliently urging the separate ends away from the work while thus permitting canting of the drill, means for longitudinally adjusting the drill upon the support, a

back plate and a fluid pressure jack acting from the back plate on the drill to feed the drill in any canted and adjusted position.

5 6. In a drill frame, base plates, a back plate, connections between the base plates and the back plate, spring guides slotted through parts of their lengths, a spring within each guide, an abutment at one end of the spring and a rider at the other end thereof, rails connecting the 10 riders in pairs and affording support for the drill and a drill travelling on the rails and at the rear of the drill engaging the back plate, whereby the rails are resiliently supported and are free to tilt, compressing the spring at one rider more than 15 the spring at another.

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