A. NEUBERT.

TOOL FRAME.

APPLICATION FILED MAY 15, 1907.

957,897. Patented May 17, 1910.

2 SHEETS—SHEET 1.

FIG. 1.

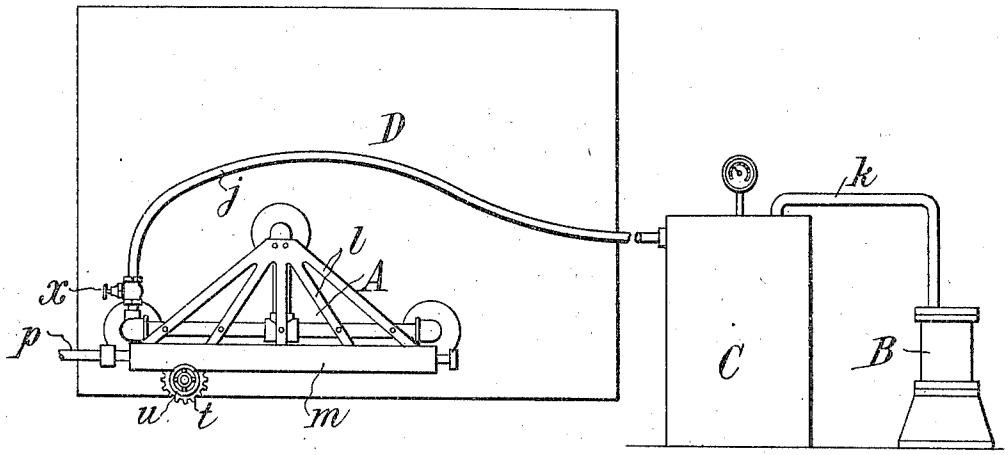


FIG. 6.

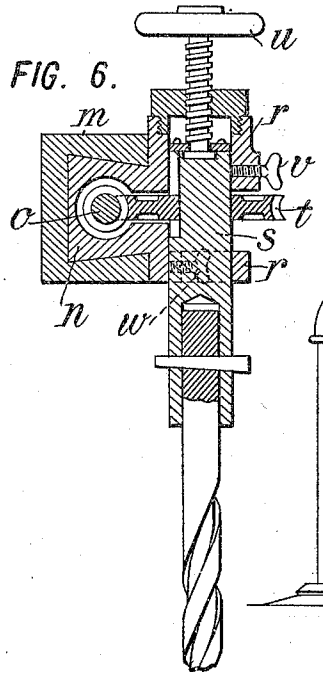
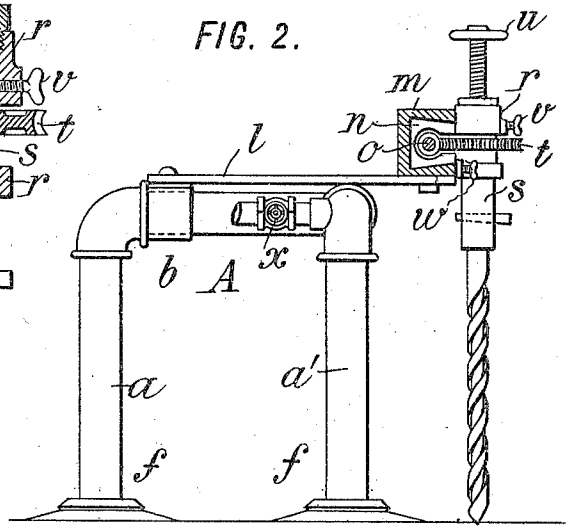


FIG. 2.



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2 SHEETS—SHEET 2.

FIG. 3.

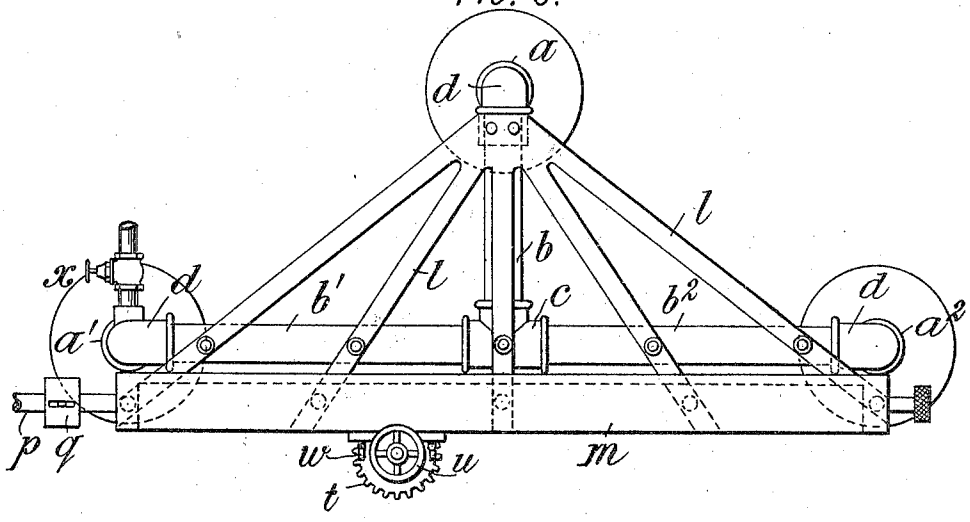


FIG. 4.

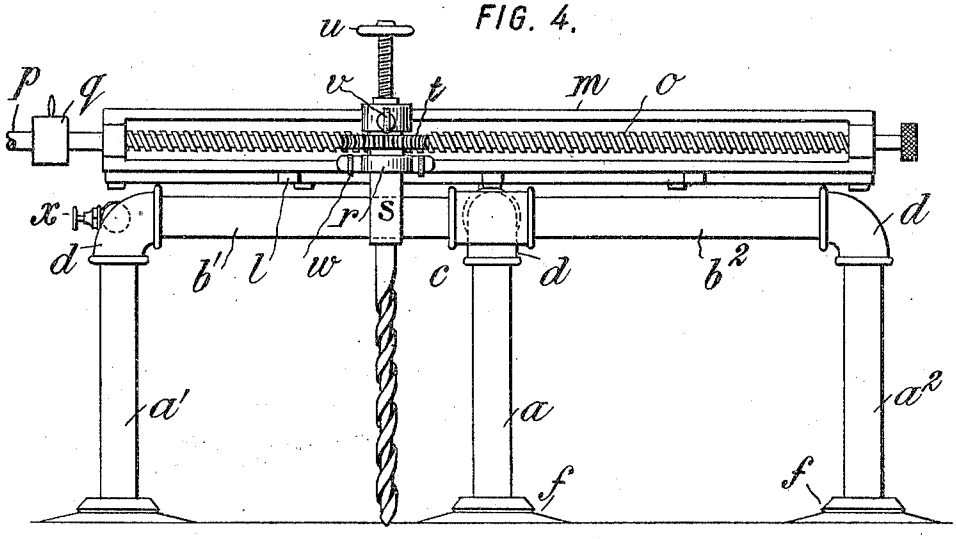
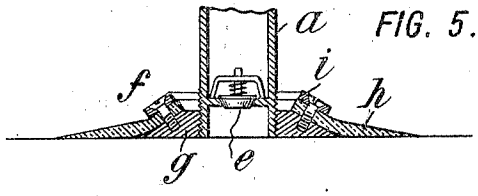


FIG. 5.



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TOOL-FRAME.

957,897. Specification of Letters Patent. Patented May 17, 1910.

Application filed May 15, 1907. Serial No. 373,788.

To all whom it may concern:

Be it known that I, ALOIS NEUBERT, born a subject of the Emperor of Austria-Hungary, and having taken out first papers of citizenship in the United States, residing in Astoria, in the borough of Queens, city and State of New York, have invented certain new and useful Improvements in Tool-Frames, of which the following is a specification.

This invention relates to frames for supporting drills and other tools.

Great difficulty has heretofore been experienced in operating with portable tools, such as drills or the like, to properly support them with relation to the work. It is customary, for instance, in the use of drills, when operating upon boilers or other devices in position or in course of construction, to drill one or more holes by hand to enable the tool frame to be clamped or bolted in position. This must be repeated at various intervals as the frame is shifted. A similar difficulty is met with in operating riveting machines, wherein it has been found necessary to provide a supplemental arm which extends within the boiler or other device to be riveted and which is connected to the main frame of the riveter at a point sufficiently remote from the tool to enable the wall of the boiler or other device to extend between the two. In other tools it has been found necessary to provide a very heavy standard or frame for the tool, in order to obtain the necessary support against which the tool rests. The disadvantages of these various means of supporting the tool are most apparent in working under water, as in repairing ships' bottoms or in other submerged work.

It is the object of my invention to provide means for supporting tools of this character without any of the disadvantages above referred to. To this end I provide a tool frame or similar device which is adapted to be held against the surface to be operated upon by fluid pressure. This pressure is obtained by providing the frame with suction feet, and exhausting the air or water from the frame, so that the atmospheric or water pressure acting against the frame hold it rigidly in position. It is very important in such a construction that the frame be arranged so that the tool can operate substantially at right-angles to the plane of the work. In this position, the stress of the tool being directly outward, it is adequately resisted by the fluid or other pressure which holds the tool in place. But if the tool is arranged so that the stress is sharply oblique, it tends to slide the frame along the surface with which it is connected. It is also important that the frame should be so constructed that it shall be free from movable parts extending from its suction passages to the exterior, since these are apt to produce a leakage sufficient to break the vacuum. Furthermore it is desirable that the frame be constructed with relatively small suction feet, so that it may be applied to curved or other irregular surfaces, it being preferable that three of such feet be used, in order that the frame may be laterally as stable as possible.

My invention provides a tool frame embodying these features and certain other improvements which will be hereinafter referred to.

In the drawings, wherein I have illustrated my invention as applied to a drill frame,—Figure 1 is an elevation of the complete apparatus. Fig. 2 is an end elevation, partly in section, of the frame proper. Fig. 3 is a plan view. Fig. 4 is a front end view. Fig. 5 is a sectional view of one of the suction feet. Fig. 6 is an enlarged detail view of the drill mounting, showing some of the parts in section.

Referring first to Fig. 1 of the drawings, let A indicate my improved tool frame as a whole. It is shown as connected with an air pump B, a tank C being preferably interposed between the two. The frame is shown as applied to an iron plate D for purposes of illustration.

Referring to Figs. 2 to 6, the frame A is shown as constructed of metal pipe, having three legs a a' a^2. The body of the frame preferably consists of three lengths of pipe b b' b^2 connected together by a coupling c, and with the legs by suitable L-fittings d. As thus constructed the frame is entirely hollow. Each of the legs a a' a^2 is provided with a suction foot f, which may be of any suitable construction, but which is shown as comprising a beveled pipe flange g having riveted to it a cup-shaped leather washer h, a metal ring i being preferably provided on

the upper side of the washer, and screws or bolts being employed to clamp the washer between the ring and the flange.

It will be understood that the frame may be provided with any suitable number of suction feet, three, however, being preferred, for the reason that this number better accommodates the frame to curved or irregular surfaces. A single foot may, however, be used under some circumstances, or any other number which may be desired. The frame will be suitably modified in accordance with the number of feet employed.

Referring now to Fig. 1, it will be seen that the frame is connected to the tank C by means of a flexible hose *j*. This hose may be of any suitable length to permit the frame to be moved to the extent desired. The air pump B is connected to the tank C by a pipe *k*, as shown, or in any other desired manner. When the pump B is operated the air or other fluid within the frame is exhausted, and the atmospheric or other pressure acting against the frame and its feet securely holds the latter in place. Any desired degree of vacuum may be employed, but I have found that a vacuum of about 15 inches results in the frame being held in position by the exterior fluid pressure to such a degree that it will resist the outward thrust of heavy drill tools or the like. When submerged the vacuum required is much less.

While the pump may be directly connected to the frame, I prefer to make use of the tank C, since by this means any slight leakage around the suction feet or elsewhere has little or no effect to release the frame, while if the tank were omitted such leakage might act to relieve the vacuum. It will be understood that the air pump B is adapted to be continuously operated, so that if leakage occurs it is promptly disposed of by the pump. When the frame is in a submerged position the pump B will practically act as a combined water and air pump.

I prefer to provide each of the suction feet with a valve such as that shown at *e*, Fig. 5, which opens toward the pump and which is provided with a suitable spring adapted to maintain it in its closed position when the pressures on both of its sides are equal. The valve *e* is adapted to prevent the frame from becoming filled with air or water when the frame is removed to adjust it in a different position. Under these circumstances the frame is cut off from the suction tube by means of a valve *x* (Figs. 1, 2 and 3), and the slight leakage which is ordinarily present shortly relieves the vacuum sufficiently to enable the frame to be moved. A special inlet valve may if desired be provided for this purpose. When the frame is being moved the external water or air flowing into the frame around the valve *e* will augment the pressure of its spring until the valve is subjected to a slightly greater pressure upon its inner face than upon its outer face. By making the valve spring a powerful one, very little of the exterior water or air will enter before the valve closes.

The tool frame thus described, or any equivalent structure, is capable of being utilized with great advantage as a support for hand tools alone. When so used the tool may be placed against one of the pipes *b b' b²*, or a plate or other support may be arranged to cross the pipes. Where the frame, however, is intended to be used for a particular purpose, such as a drill frame, I prefer to provide it with accessory mechanism which will enable the tool to be more conveniently used.

In the drawings I have illustrated my invention as adapted for drilling holes in plates of ships. In the construction shown the frame is provided with a number of arms *l* fastened to the rear of the frame and extending out in front of the latter, where they serve to support a guide *m* in which a carriage *n* is adapted to travel. The frame also has bearings at each end for a screw-threaded shaft or worm *o* which is connected at one end with a flexible shaft *p* through the medium of a suitable coupling *q*. The carriage *n* is provided with a passageway for the worm *o*, and is formed in front of the latter with suitable bearings *r* for a drill holder *s*. The latter has fixed to it a worm wheel *t* which meshes with the worm *o*, so that when the latter is driven the drill is turned. An adjusting screw *u* engaging a suitable screw-threaded portion of the carriage is provided for moving the drill forwardly or backwardly. I prefer to utilize the worm *o* not only as the driving means for the drill, but also as a feeding device for the latter. To this end I provide a thumb-screw *v* which is adapted to clamp the drill holder *s* in place so that it cannot rotate in its bearings. When this is done the rotation of the worm moves the carriage *n* in a lengthwise direction to the proper point for the drilling operation. When such point is reached, thumb-screws *w w* are screwed in, engaging the guide *m* and holding the carriage *n* fixed in the desired position. This construction also permits the carriage *n* to be moved by hand in either direction. Should it be desired to reverse the drill, the direction of the flexible shaft may be reversed in any suitable manner, or the coupling *q* may include a reversing gear, so that the drill may be reversed by the operator.

It will of course be understood that the device hereinbefore described is to be taken merely as an illustration of my invention, since the latter includes any equivalent means for accomplishing the results referred

to. Many modifications may hence be made without departing from the invention. Preferably, however, the frame should be so constructed as to fit it for irregular surfaces, and should provide an exteriorly-accessible means for mounting the tool.

What I claim is:—

1. A frame for tools having a pair of legs a' and a^2 provided with suction feet, means for carrying a tool on said frame out of line with said legs, and a third leg a out of line with the legs a' and a^2.

2. A frame for tools comprising three lengths of pipe b, b' and b^2, a coupling c uniting them, legs a, a' and a^2 at the ends of said lengths, suction feet on said legs, and means for carrying a tool alongside of said lengths b' and b^2.

In witness whereof, I have hereunto signed my name in the presence of two subscribing witnesses.

ALOIS NEUBERT.

Witnesses:
EUGENE V. MYERS,
FRED WHITE.