May 6, 1924. 1,493,457

J. T. WRIGHT

DRILL HEAD

Filed Aug. 24, 1922 2 Sheets-Sheet 1

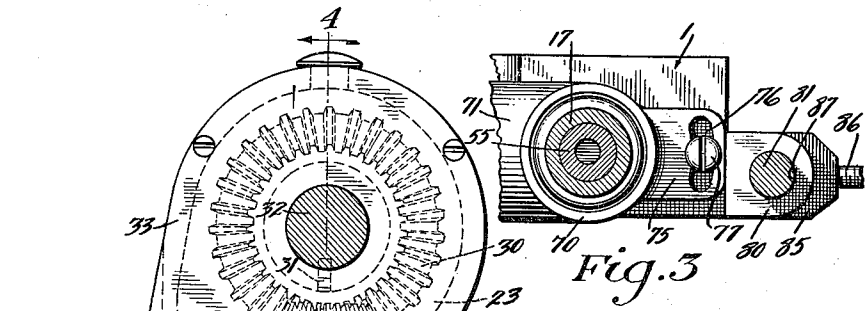

Fig. 3

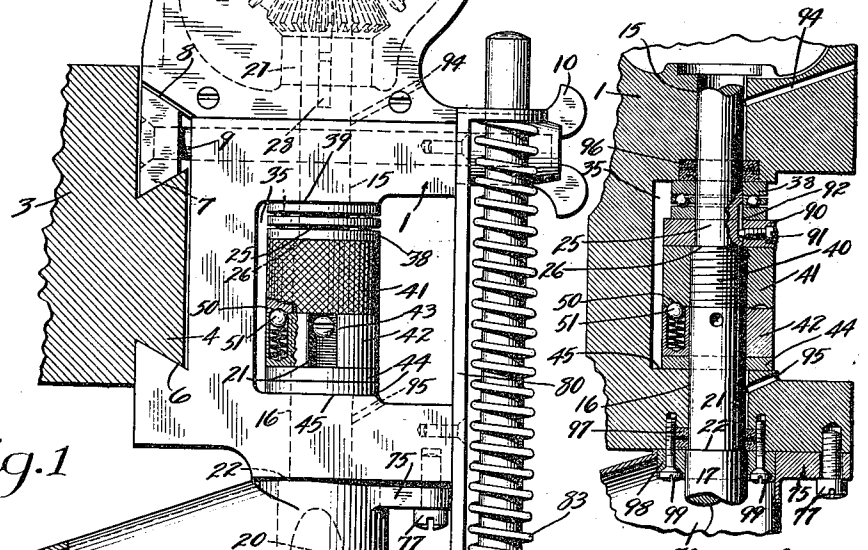

Fig. 1

Fig. 7

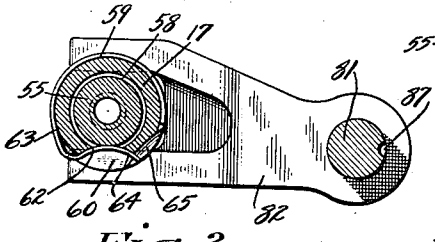

Fig. 2

Inventor
Joseph T. Wright

By Wood & Wood

Attorneys

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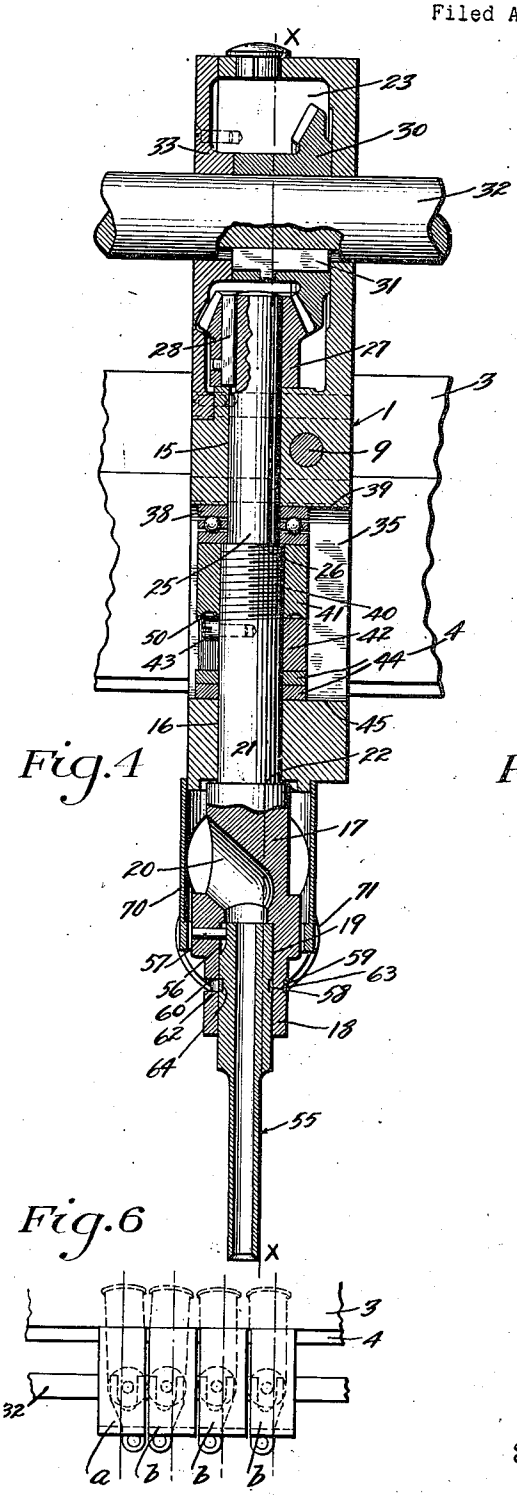

Fig. 4

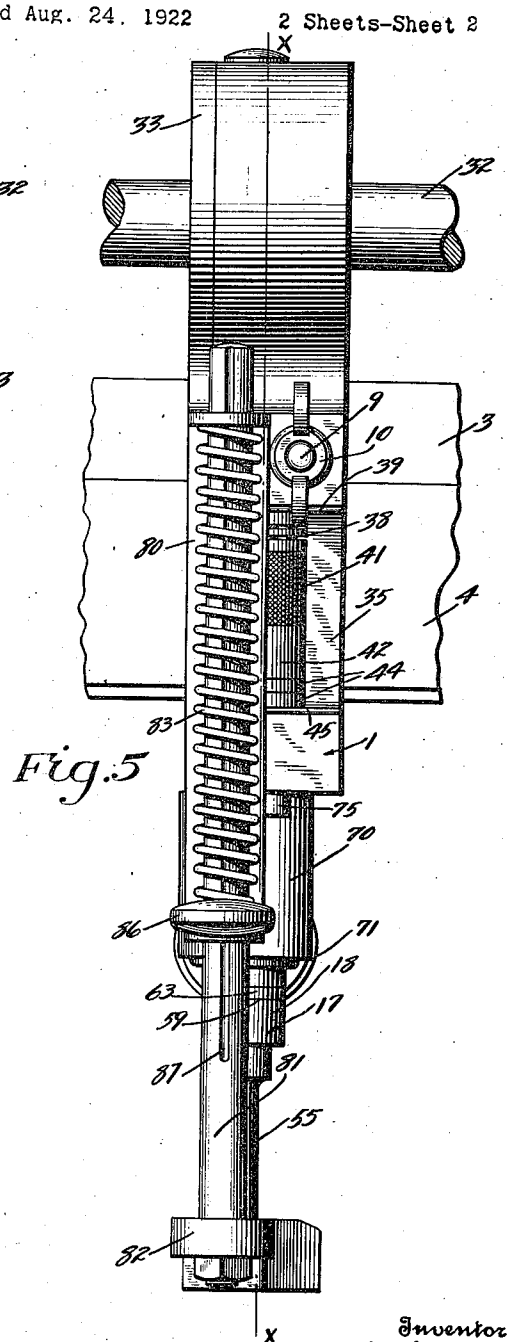

Fig. 5

Fig. 6

Inventor
Joseph T. Wright

By Wood & Wood

Attorneys

Patented May 6, 1924. 1,493,457

UNITED STATES PATENT OFFICE.

JOSEPH T. WRIGHT, OF CINCINNATI, OHIO, ASSIGNOR TO THE J. T. WRIGHT COMPANY, OF CINCINNATI, OHIO, A CORPORATION OF OHIO.

DRILL HEAD.

Application filed August 24, 1922. Serial No. 584,142.

To all whom it may concern:

Be it known that I, JOSEPH T. WRIGHT, a citizen of the United States, and residing at Cincinnati, in the county of Hamilton and State of Ohio, have invented a new and useful Improvement in Drill Heads, of which the following specification is a full disclosure.

This invention relates to machine tools and is particularly directed to a tool-carrying unit or drill-head designed to be suitably adjustably supported upon the machine frame, a plurality of such units or heads being usually employed and rotatively adjusted upon the frame to position the cutting tools carried thereby in predetermined spaced relations for correspondingly boring or drilling the stock. The units are especially designed for use on paper drilling machines wherein a suitable number of the same are adjustably mounted upon a stationary frame and relatively spaced for simultaneously drilling a plurality of spaced openings in the sheets, the paper being held upon a table movable to and away from the drilling or cutting tool.

An object of the invention is the provision of a drilling unit or drill head providing means thereon for slidably attaching and clamping the same to a support, and providing a rotatable drill spindle in said frame, said spindle translatable longitudinally of its axis.

Another object is the provision of means for micrometrically translating said spindle and locking the same in translated or adjusted position.

Another object is the provision of means for locking a tool in the translatable spindle.

Another object is the provision of means for the vertical adjustment and non-rotative locking of a presser foot rod carried by the unit and designed to sustain a presser foot in fixed angular relation relative to the cutting or drilling tool, and at the same time allowing vertical movement of the presser foot relative to the tool.

Another object is to provide for a closer relative spacing of pairs of drill spindles for boring correspondingly spaced openings in the stock, the object being furthered by offsetting the spindle either to the right or left of the transverse center of figure of a given unit, providing right and left units, which when properly placed together in pairs permit of more closely spaced disposition of the tools carried thereby.

Another object is the provision of means for disposing of the drillings from the cutting tools, and to provide for the non-interfering angular adjustment thereof in conformity to the spacing of the drill units when combined in pairs for close tool spacing.

Another object is the provision of means accessible from the front of the drill-head or unit, for clamping the same to a rail.

Another object is the provision of means for preventing the deposit of oil on the spindle below the spindle bearings.

Other objects and certain advantages will be disclosed in a description of the drawings forming a part of this application, and in said drawings:

Figure 1 is a side elevation of my improved tool-carrying or drilling unit, shown attached to a suitable support.

Figure 2 is a section on line 2—2, of Figure 1, illustrating the manner of locking the tool within the translatable spindle.

Figure 3 is a section on line 3—3, of Figure 1, showing the relation of the means for disposing of the drillings of the tool and manner of adjusting the same.

Figure 4 is a vertical section on line 4—4, of Figure 1, illustrating a type of unit in which the spindle is offset to the left of the transverse center of figure of the frame.

Figure 5 is an elevation of the structure of Figure 4, viewed from the presser rod side of the device.

Figure 6 is a diagrammatic plan showing the relation of a pair of "right" and "left" units placed together to permit of more closely spacing the spindles carried thereby, and showing, in addition, other un-paired units, and

Figure 7 is a sectional view taken in a plane at right angles to that of Fig. 4, illustrating a modification.

Each drilling unit comprises a frame or head 1 of substantially rectangular skeleton configuration, upon which head are mounted all elements of the unitary structure, a plurality of units being generally employed, each slidably mounted upon a common support and capable of being clamped in adjusted positions thereon, relative to one another. The support or rail 3 is mounted

upon a suitable stationary frame, which may be a part of a machine, (not shown), and has upon its outer face a horizontal dove-tail projection 4, against the lower and upper inclined faces of which are respectively engaged the inner face of a projection 6 of the frame 1 and one face of the clamp-block 7, the opposite face of said block engaging the corresponding face 8 of the frame. A bolt 9, having its head countersunk in the block 7, loosely traverses the frame horizontally and projects therefrom at its forward side, a suitable thumb nut 10 being engaged with the threaded end of the bolt. When the thumb-nut 10 is manipulated to clamp the drill-head, the block 7 is drawn inwardly toward the frame or head, the lower inclined face of the block 7 sliding upwardly against the upper dove-tail surface, drawing the frame tightly against said dove-tail projection. The thumb-nut 10 is disposed at the forward side of the frame where it is readily accessible.

The frame 1 provides openings 15, 16, as bearings for a rotatable longitudinally translatable drilling spindle 17, in this instance vertically disposed, said spindle having a head 18 providing a tool socket 19, and said socket communicating with an upwardly and outwardly directed discharge passage 20, opening at the side of the head. The spindle above the head is counterturned as at 21 to provide a shoulder 22 which is slightly spaced from the lower side of the frame 1. The spindle is further counterturned as at 25 to provide a shoulder 26, this counterturned portion extending through the bearing opening 15 and into a housing 23 formed as an integral part of the frame at its top. A bevelled gear 27 is disposed within the housing and is splined as at 28 to the upper end of the counterturned portion 25 of the spindle, the hub of the gear bearing upon the lower interior wall of the housing. Meshing with the gear 27 is a companion bevelled gear 30 splined as at 31 to a drive shaft 32, which shaft rotatively traverses the walls of the housing and cover plate 33 therefor, said plate being clamped to the housing by suitable screws.

Means for adjusting the spindle, to compensate for tool wear, forms an important feature of this invention, which adjustment is provided for in the following manner:

The frame 1 is open as at 35 for the reception of the spindle adjusting means which consists of a thrust ball bearing 38 abutting the upper wall 39 of the opening 35 and engaged at its lower side by the shoulder 26 of the spindle, the counterturned portion 25 extending rotatively through the element of the bearing. The upper end of the counterturned portion 21 is threaded as at 40 for engagement with the corresponding threads of a knurled adjusting collar or annulus 41 which rests upon a split collar 42, held from rotation upon the spindle by a pin 43, which pin lies between the terminals of the split collar and also functions to limit the range of lengthwise spindle adjustment. The split collar 42 in turn rests upon the upper washer of superposed washers 44, which washers are supported by the lower wall 45 of the opening 35. The lower edge of the adjusting collar 41 is provided with a relatively right-angularly disposed diametrically related pair of spherical sockets 50 engageable by a spring pressed locking ball 51 pocketed in the split collar 42. By rotating the collar 41 a longitudinal micrometric adjustment of the spindle may be obtained. The arrangement of the sockets 50 provides for the locking of the collar after each rotation through an arc of 90°.

The units are made in "rights" and "lefts" to permit of a closer spacing between the cutting tools, so that, in some instances, pairs of relatively more closely spaced openings may be drilled. As shown in Figure 6, right and left units are respectively designated *a*, *b*.

In order to make a closer spacing of the drills possible, the drill spindle is offset, in one instance, to the right of the center line *x*—*x* passing through the transverse center of figure of a frame or head 1, and in other frames, is offset to the left of such center line. Pairs of left and right units may be combined to obtain closer spacing of the spindles, as best illustrated at the left end of Figure 6.

A novel feature of the invention resides in the manner of fastening or locking the tool or drill within the tool socket. The tool 55, as herein shown, is designed for cutting or drilling paper, although any other form of tool may be used. The tool is of tubular formation providing a passage through which the cuttings are forced upwardly and delivered through a discharge passage 20, which passage is surrounded by an adjustable housing having formed integrally therewith, a discharge spout. The shank of the tool 55 is grooved as at 56 for engagement with a pin 57 projecting laterally into the socket, which structure prevents the turning of the drill. Midway of the shank of the drill is provided a circumferential locking groove 58. The spindle head 18 provides a groove 59 in the same plane, when the tool is seated, with the groove 58. The groove 59 is circularly machined and deepened at one portion through a small arc of its circumference, to extend through the wall of the spindle head and to communicate with the groove 58, thus providing the circular depression 60, and opening 62 through the

spindle head. A spring locking clip 63 is engaged within the groove 59 and has an inwardly bowed terminal portion 64 engaged with the depression 60 conforming to the configuration thereof and extending through the opening 62 into the groove 58, locking the tool.

Adjacent to, overlapping the machined portion 60, and lying symmetrically across the groove 59, is a spherical depression 65 into and beyond which the terminal of the bowed portion 64 projects, enabling a finger grip to be obtained upon the clip for springing the bowed portion outwardly to release the clip from the groove 58 of the tool.

Means for disposing of the cuttings delivered through the tool and passage 20 is provided, which means has the form of the housing 70, surrounding spindle head and discharge passage 20, below the frame 1.

Integrally formed with the housing, and extending rearwardly and downwardly therefrom, is a spout 71, the end of which may be flexibly connected with a suitable suction exhaust system, not shown.

As shown in Figure 4, a discharge passage 20 is disposed to deliver the cuttings at a point where they will be readily drawn into the spout 71. The housing and spout are concentrically adjustable about the spindle to allow for non-interferingly positioning the same, when right and left units are combined as in Figure 6, in which Figure the spouts are shown, in dotted lines, in their properly adjusted position, a slight adjustment only being necessary.

Extending rearwardly from the upper end of the housing 70 and disposed against the under surface of the frame, is an arm 75, provided with an arcuate slot 76 concentric with the axis of the spindle, through which slot extends the threaded screw 77 engaged with the frame 1. Proper angular adjustments are made by rotating the housing.

Attached at the front of the frame 1, and bridging the opening 35, is a bracket 80 providing parallel horizontal extensions having vertically aligned openings therein, within which openings is slidably disposed a spring depressible rod 81 having removably and non-rotatably attached at its lower end a forked presser foot 82 designed to engage the stock to prevent the slipping of the same when being drilled or bored. The presser foot is adjusted so that the tool operates between the arms of the fork. As the drill travels through the stock upon the upward movement of the table (not shown) the presser foot is raised against the action of the spring 83 which is disposed about the rod 81, abuts the upper extension of the bracket at one end and its other end abuts a rectangular block 85 slidably traversed by the bar. This block has a rear plane surface slidably engaged against the vertical plane face of the bracket and is provided with a dog-point clamp screw 86, the point of which engages within a longitudinal groove 87 of the bar. By this means, the rotation of the bar and presser foot is prevented and both may be adjusted vertically to obtain the proper presser foot tension, while the bar is left free to slide in its support.

In Figure 7 is shown a modification of the spindle translating and locking means in which additional provision is made for preventing the rotation of the adjusting collar 41, after being set in any predetermined manner. In this form of invention, a collar 90 is interposed between the adjusting collar 41 and the lower element of the bearing 38. The collar 90 is non-rotatively held to the spindle by a set screw 91 engaging the groove 92. Thus a non-rotative element is disposed between two rotative elements to prevent mis-adjustment of the collar 41.

In order to prevent the leakage of oil, delivered to the spindle through the passages 94, 95, of the drill head or frame, a packing disk 96 surrounds the spindle and is socketed in the frame above the thrust bearing 38, and an additional washer 97 is socketed in the lower face of the frame and held therein by an annulus 98 surrounding the spindle, held clamped against the lower face of the frame and washer 97 by screws 99. The annulus 98 also acts as a means for rotatively centering the housing 70 about the spindle, thus performing a double function.

Having described my invention, I claim:

1. A machine tool, comprising a frame, means attached to said frame for adjustably attaching the same to a support, a spindle rotatively and translatably mounted in said frame, means for micrometrically translating said spindle, means for locking said micrometric translating means, and means housed in said frame for rotating said spindle.

2. A drilling unit, comprising a frame slidable upon a support, means carried by said frame for clamping the same to said support, a spindle journaled in said frame and translatable therein, gears for driving said spindle, said gears housed in said frame, a drive shaft in splined connection with one of said gears and slidably traversing said housing, and means for the micrometric longitudinal adjustment of said spindle, said means comprising an annulus having threaded engagement with said spindle and having end sockets therein, a split-ring splined to said spindle abutting said annulus and having a spring-pressed ball therein engageable with said sockets, and thrust-receiving elements respectively inter-

posed between the outer ends of said annulus and split-ring and said frame.

3. A frame, a spindle therein, having a head providing a drill socket therein, a passage communicating with the said socket and leading to the periphery of said head, a housing attached to said frame inclosing said head about said passage, a spout leading from said housing, means for the concentric adjustment of said housing about said head, and means for locking said housing in adjusted position.

4. A frame, a spindle journaled in said frame. said spindle carrying a tool, a rod slidably mounted upon said frame, a rectangular stop traversed by said rod for limiting the movement of the same, a compression spring surrounding said rod and abutting said stop and frame, a longitudinal groove in said rod, a screw traversing said stop and engaging said groove, one face of said rectangular stop engaging the said frame to prevent rotation of said stop.

5. A tool lock, comprising a head having a socket therein, a circumferential groove in said head, said groove deepened at one portion and extended through said head and in communication with said socket, a depression in the face of said head overlapping the plane of said deepened portion of said groove, a spring clip in said groove having an arcuate portion conforming to the configuration of said groove and extending therebeyond for engagement with the groove of a tool inserted in said socket, the terminal of said arcuate portion of said clip projecting into and beyond said depression and deepened portion to provide a finger hold.

6. In combination with a head having a tool socket therein, of a tool within said socket, said tool having a circumferential groove in its shank portion, of a circumferential groove in the face of said head, said groove circularly deepened at one portion to communicate with said socket, a clip in said outer groove engageable with said deepened portion and with said inner groove.

7. A drilling unit,. comprising a frame slidable upon a support, means carried by said frame for clamping the same to said support, a spindle journaled in said frame and translatable therein, gears for driving said spindle, said gears housed in said frame, a shaft slidable through one of said gears and said housing for rotating said gear, and means for the micrometric longitudinal adjustment of said spindle, said means comprising an annulus having threaded engagement with said spindle and having end sockets therein, a split ring splined to said spindle abutting said annulus and having a spring pressed ball therein engageable with said sockets in said annulus, thrust receiving elements respectively interposed between the outer ends of said annulus and split-ring and said frame, and a ring non-rotatively attached to said spindle between said annulus and adjacent the thrust receiving element.

8. In combination with a rail having a dove-tailed projection, a head, a projection on said head engaging one surface of said dove-tailed projection, a dove-tailed block engaging the other surface of said dove-tailed projection, a bolt, socketed in said dove-tailed block, loosely traversing said frame, projecting therebeyond and threaded at its forward end, and a thumb-nut, engageable with said threaded end, accessible from the forward end of said frame.

9. A drill-head, a spindle journaled in said frame and translatable therein, gears for driving said spindle, said gears housed in said frame, a drive shaft in splined connection with one of said gears and slidably traversing said housing, and means for micrometrically translating said spindle, said means comprising an annulus having threaded engagement with said spindle and having end sockets therein, a split ring splined to said spindle abutting said annulus and having a spring-pressed ball therein engaging with said sockets, a thrust receiving element interposed between said split ring and said frame, a sleeve abutting said annulus, fastened to said shaft, and thrust receiving elements between said sleeve and said frame.

10. A drill-head, a translatable spindle journaled therein, means for micrometrically adjusting said spindle longitudinally, and means for locking said micrometric adjusting means, an oil groove, leading to said spindle above said adjusting means, an absorbent washer, socketed in said frame above said adjusting means, engaging said spindle, an oil groove below said adjusting means communicating with said spindle, an absorbent washer socketed in said frame disposed about said spindle, a collar surrounding said spindle and clamped against said washer, and a housing engaging said collar and rotatable thereabout.

In witness whereof, I hereunto subscribe my name, as attested by the two subscribing witnesses.

JOSEPH T. WRIGHT.

Witnesses:
L. A. BECK,
R. KISTNER.