

June 10, 1924.

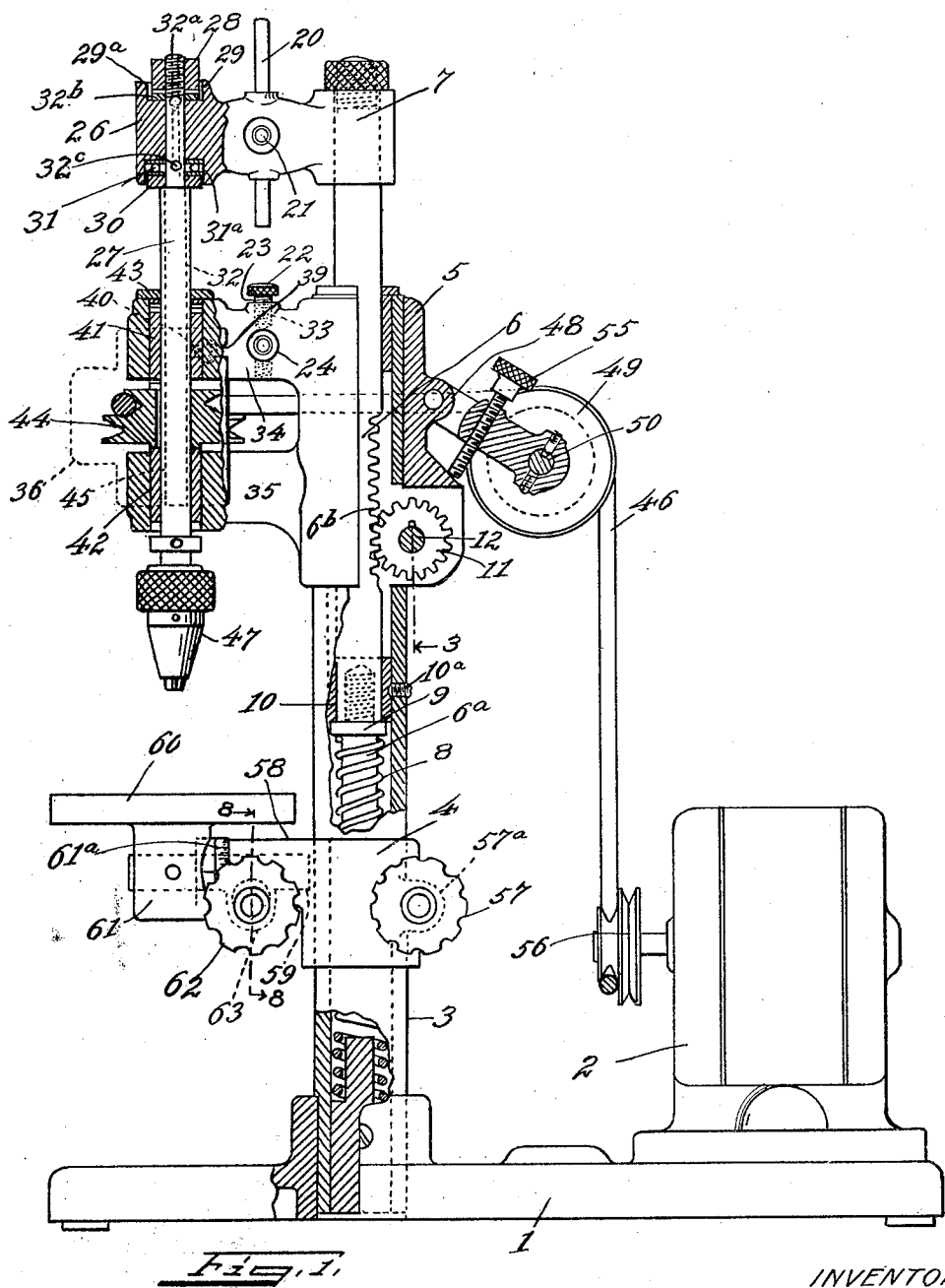
A. MUEHLMATT

1,497,579

BENCH DRILL

Filed April 23, 1920

3 Sheets-Sheet 1



INVENTOR:

George Muehlmann  
BY *Walter Keller*  
ATTORNEYS.

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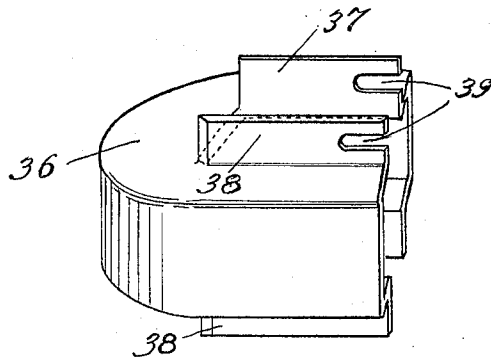
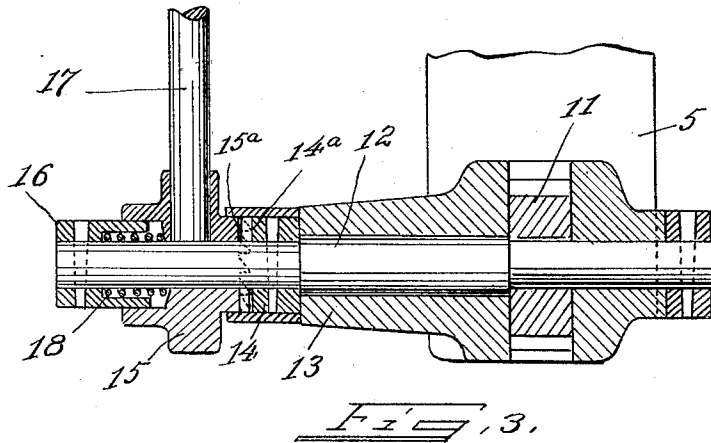
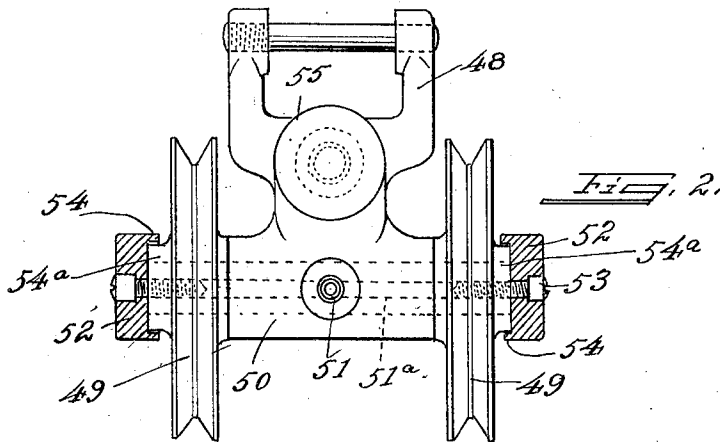
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A. MUEHLMATT

BENCH DRILL

Filed April 23, 1920

3 Sheets-Sheet 2



INVENTOR:

A. Muehlmann

BY Allen Allen

ATTORNEY.



## UNITED STATES PATENT OFFICE.

ADOLPH MUEHLMATT, OF NEWPORT, KENTUCKY.

## BENCH DRILL.

Application filed April 23, 1920. Serial No. 375,955.

*To all whom it may concern:*

Be it known that I, ADOLPH MUEHLMATT, a citizen of the United States, and a resident of Newport, Campbell County, Kentucky, have invented a certain new and useful Bench Drill, of which the following is a full, clear, and exact description, reference being had to the drawings forming part of this specification.

My invention relates to drills, which are employed upon relatively fine work and known as bench drills. For drilling operations such as are required of the jeweler, for example, I know of no small drill press which is calculated to take care of the work, the usual practice being for the operator to hold the work in his hands, and advance it bodily against the revolving drill, rather than to employ a drilling machine with a movable head.

It is the essential object of my invention to provide a bench drill press, having all of the delicacy of operation required by the bench worker, laboratory worker, jeweler and the like. Among other things I provide in my new machine for an operating lever which permits of the operator sensing the movement of the drill in the work. I also provide a work support element which permits of special uses in bench work and jewelry work. In connection with the lubrication of the device I provide against the chances of oil splattering while providing a complete and very effective lubrication throughout. Another point is the stop for the movement of the head which is of micrometer nature.

In general it is my object to make of a bench drill press an instrument of precision, suitable in every detail for the very finest and most delicate work and I accomplish this object and other advantages noted and to be noted, by that certain construction and arrangement of parts to be hereinafter more specifically pointed out and claimed.

In the drawings,

Figure 1 is a side elevation of the complete device, same being broken away at several points.

Figure 2 is a plan view of the idler pulley attachment.

Figure 3 is a sectional view taken longitudinally of the gear and ratchet shaft, for operating the head supporting rack on the line 3-3, of Figure 1.

Figure 4 is a perspective view of the guard for the driving pulleys.

Figure 5 is a detail perspective of the working parts for the drill shaft.

Figure 6 is a detail view half in elevation and half in section of a special work holding chuck.

Figure 7 is a like view of another form of special work holding device, these last two devices being substituted for the plain work supporting table of Figure 1.

Figure 8 is a section on the lines 8, 8, of Figure 1.

The device is shown as provided with a base 1, upon which is mounted the electric motor 2. The base has a hollow pedestal 3 on which is mounted the adjustable work table bracket 4 and fixed casting 5 which mounts the various power transmission parts of the mechanism.

Sliding in the pedestal is the rack bar 6, which at its upper end carries the head 7 of the machine. Within the hollow base of the pedestal is set a spring 8 which engages around the lower end 6<sup>a</sup> of the rack bar and bears against a collar 9 on said bar. This spring tends to press the rack bar, and hence the machine head, upwardly, and the collar is provided with a stop comprising a bushing 10 held within the pedestal by a set screw 10<sup>a</sup>, which also guides the bar. The bushing is set so that it stops upward movement while the drill shaft is still free to rotate.

Mounted within a suitable space in the casting 5 and the pedestal is a pinion 11 which meshes with the teeth 6<sup>b</sup> of the rack bar. This pinion is on a shaft 12, which is housed in a journal member 13 formed in the casting 5, said shaft having likewise pinned thereto a ratchet disk 14, having facial teeth 14<sup>a</sup>.

A collar element 15 is set rotatably over the shaft 12, said element having matching ratchet teeth 15<sup>a</sup> to mesh with the teeth 14<sup>a</sup>. The collar is pressed resiliently against the ratchet disk 14 by means of a spring 18 housed in a cap 16 pinned to the outer end of the shaft.

A long handle 17 which may be long enough to reach down to the base of the structure, is set in a suitable socket in the collar element 15, and serves to operate the rack and pinion device which effectuates the movement of the head. Since the spring 8

resists the downward movement of the rack bar, and assists the upward movement, and the situation demanding as it does, delicacy of touch, rather than a quick return of the head from operating position, I prefer that the tension of said spring be not very appreciable to the operator as he works the handle.

Counterclockwise movement of the shaft 12 serves to impel the rack bar downwardly, and clockwise movement of the operating handle is permitted by the ratchet device, under tension of the spring 18. This tension is sufficient to enable the ratchet to hold during clockwise movements of the handle to lift the rack bar, but will give to permit the handle to be adjusted after the head has been brought up as far as it will go.

The advantages of being able to adjust the handle with reference to the shaft 12, is that the operator, having determined the length of stroke of the handle which is necessary for a certain operation can adjust the handle so that the path of movement thereof is most convenient for him and gives him the greatest sense of "feel" under actuation.

The downward limit of movement of the head of the machine is provided for by means of a very accurate stop. Thus a pin 20 is mounted vertically and slidably in the transverse body of the head under control of a finger screw 21, acting as a set screw and bears against a screw head 22 of a screw 23 that is threaded into the upper transverse arm of the casting 5. The screw 23 is preferably under the control of a finger screw 24, threaded into the casting arm at right angles to the said screw 23 and carrying at its end a suitable engaging member for the threads of the said screw 23.

By this construction the stop pin may be adjusted first and then the screw head 22 adjusted and locked, thereby providing a micrometer-like adjustment for the said head, same serving as an abutment for the stop pin.

The head of the machine carries in the sleeve 26 thereof, the tool shaft or drill shaft 27. This shaft is held at its upper end by a nut 28 and carries also a washer 29, said washer and the lower portion of the nut positioned to remain in a countersink 29<sup>a</sup> in the sleeve end. A disk 30 carried on the shaft is provided with a thrust ball bearing 31 in a recess 31<sup>a</sup> at the lower end of the sleeve.

In instances wherein the drill shaft is pressed upwardly by the operator as in reaming out holes, the bearing 31 will take the thrust because the stop bushing 10 prevents the head rising high enough to permit contact of any revolving part with the casting 5.

The oiling of the shaft bearing is accomplished through a central hole 32<sup>a</sup> which ex-

tends down to a point adjacent the roller bearing. A radial hole 32<sup>b</sup> carries oil centrifugally to the upper end of the shaft and a like hole 32<sup>c</sup> carries oil to the roller bearing.

The shaft has also a groove 32 running the full length thereof which receives oil from the holes 32<sup>b</sup> and 32<sup>c</sup>. The recess 31<sup>a</sup> is made deep enough for the walls thereof to prevent oil being dashed centrifugally off the disk 30 since any oil that is thrown will be caught on the walls of the recess. This is also true as to the upper recess 29<sup>a</sup>.

The casting 5 is formed with two arms 34 and 35, which are squared off at their ends and provided with ribs 34<sup>a</sup>, and 35<sup>a</sup> respectively, to receive a guard 36. This guard has a semi-cylindrical shape and has ears 37, 38 extending upwardly and downwardly from its median opening. The ears slide between the ribs and hold the guard firmly in place, there being suitable slots 39 in the upper two ears to slide over clamping screws 40.

The two square ends are vertically cored to receive bushings 41 and 42, through which passes the drill shaft. The bushings are arranged so that they terminate just above the lower edge and below the upper edge of the casting arms. The oil which is thrown centrifugally from the shaft in its revolution will thus be flung against the walls of the cored out holes in the casting arms and not splattered on the operator or his work. A felt washer 43 is preferably set in the recess left at the top of the upper arm and a gravity washer set over the shaft.

Mounted over the shaft intermediate the two arms is the double pulley 44, which is suitably splined to slide in the groove that runs longitudinally of the drill shaft, this groove being in addition to the oil groove. When driven by the belt 46, the pulley device serves to rotate the drill shaft but permits its movement longitudinally to bring it up against and through the work. The shaft has any desired form of chuck 47 for engaging the desired drill or other tool.

The idler and belt tightener pulley device consists of a hanger 48 hinged at the rear of the casting 5, and carrying the two idler pulleys 49, 49, on a fixed shaft 50. The shaft may be oiled through the oil hole 51 and has a longitudinal groove 51<sup>a</sup> to carry the oil to the pulley and the ends of the shaft at the sides of the housing formed in the hanger, are protected against oil throwing. The means for accomplishing this are flanged washers 52, held to the ends of the shaft by means of screws 53. The flanges 54 of the washers overlie the hubs 54<sup>a</sup> of the two pulleys.

A stop screw 55 is provided which positions the hanger at the desired angle for maintaining the belt tightly. As shown the

belt is preferably actuated by a pulley 56 set on the rotor shaft of the motor. This pulley may be a double pulley, as in the case of the pulley 44, thereby permitting speed regulation by shifting of the belt manually.

The work table, as has been noted, is mounted over the pedestal of the machine by means of a bracket 4. This bracket comprises a split collar adjustable of the pedestal and to be held in adjusted position by means of a hand screw 57 engaging the wings 57<sup>a</sup> of the split collar. The bracket arm 58 of the work table support may be split and hollow, so that it can be clamped over the cylindrical arm 59 of the table but preferably will have some approved form of turret tool engaging device.

In the simplest form of table, there is a round flat member 60 having a boss 61 in which the supporting arm is fixed, and having a calibrated scale 61<sup>a</sup> around that edge of the boss which abuts against the end of the bracket arm. The thumb screw 62 engages a cylindrical bar 62<sup>a</sup> set in a hole bored laterally through the arm and carries a sleeve 62<sup>b</sup> thereon. The sleeve and bar are shaped to engage the arm 59 and upon screwing down the screw 62 they will tightly retain the arm 59 between their shaped ends. A suitable mark on the end of the bracketed arm is to be read against the graduations of the scale on the table supporting boss.

As has been stated various forms of work support may be provided to fit into the bracket arm. I have illustrated two additional forms, which will form the basis for further applications for patent. As shown in Figure 6 the arm 59<sup>a</sup> corresponding to the arm 59 is engaged in the bracket arm, and carries a sleeve 64 for a chuck. The chuck elements comprise the grasping arms 65, under the control of an internally threaded operating head 66. The beveled sleeve 67 that is set between the main sleeve 64 and the grasping arms may be revolved by means of the head, said sleeve 67 having notches 68 therein that are engaged by a spring finger 69. The purpose of this rotary motion is to permit the operator to revolve his work step by step, by releasing the spring finger and turning the whole chuck around in the sleeve 64.

Another form of work holder is shown in Figure 7 wherein the arm 59<sup>b</sup> corresponds to the arm 59 and the work engaging means is a recessed bar 70 having female centering blocks 71, 71<sup>a</sup> set into its ends and operating to hold the work down in the recess 72. To operate the blocks I provide the main hand screw 73 and provide the block 71<sup>a</sup> with a head 74 of its own, this latter wedge block having a threaded portion 75. The conical bearing faces of the blocks will grasp and readily center a metallic bar which is to be acted on through the center of the block 71<sup>a</sup>.

It is not desired because of my detailed description of a complete embodiment of my invention as given above to do more than illustrate the principles involved in my invention which will be set forth in the appended claims.

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

1. In a drill press of the character described, the combination of a standard, a rack in said standard, a sleeve rigidly mounted on said rack, a drill shaft, non-slidably held in said sleeve, and having an anti-friction thrust bearing against upward movement through said sleeve on the standard, a pair of fixed guide sleeves through which the said drill shaft is moved, a driving element on the drill shaft intermediate the guide sleeves, and a stop for the rack adapted to hold the drill shaft in a position of highest upward adjustment, with the drill shaft out of contact with the standard.

2. In a drill of the character described the combination with a standard of a drill shaft movably supported thereon, said shaft having a plurality of guiding sleeves through which it moves, and a driving element located between said sleeves and means for moving the drill shaft vertically, located above the guiding sleeves, said means being connected to a rack held by the standard, and a gear meshing with the rack, and a spring held ratchet handle for operating the gear, said spring having sufficient tension to maintain the handle engagement for an upward movement of the rack.

ADOLPH MUEHLMATT.