(No Model.) 2 Sheets—Sheet 1.

P. HOENSCHEID.

TWIST DRILL MILLING MACHINE.

No. 486,970. Patented Nov. 29, 1892.

Fig. 1.

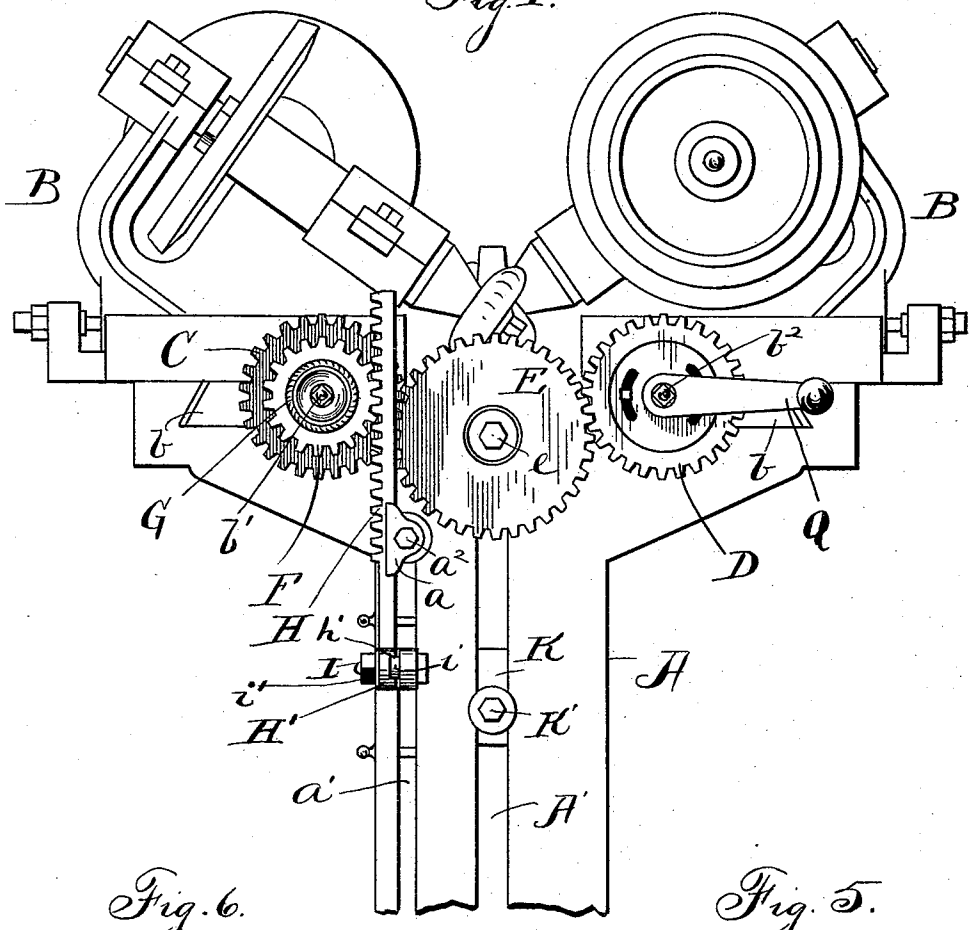


Fig. 6.

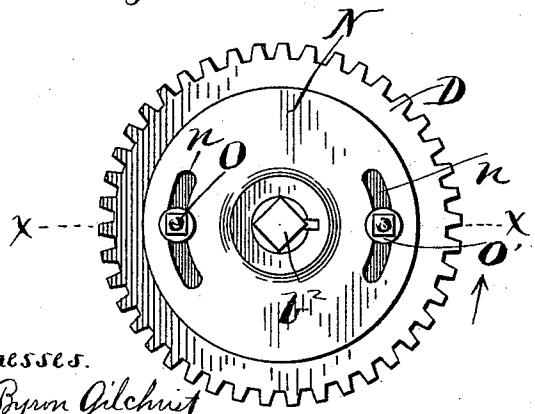
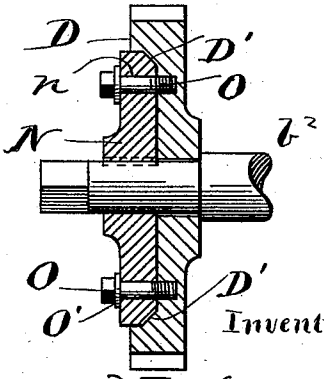


Fig. 5.



Witnesses.
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Howard

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By Lyon & Lyon
His Attorneys

(No Model.) 2 Sheets—Sheet 2.

P. HOENSCHEID.

TWIST DRILL MILLING MACHINE.

No. 486,970. Patented Nov. 29, 1892.

Fig. 2.

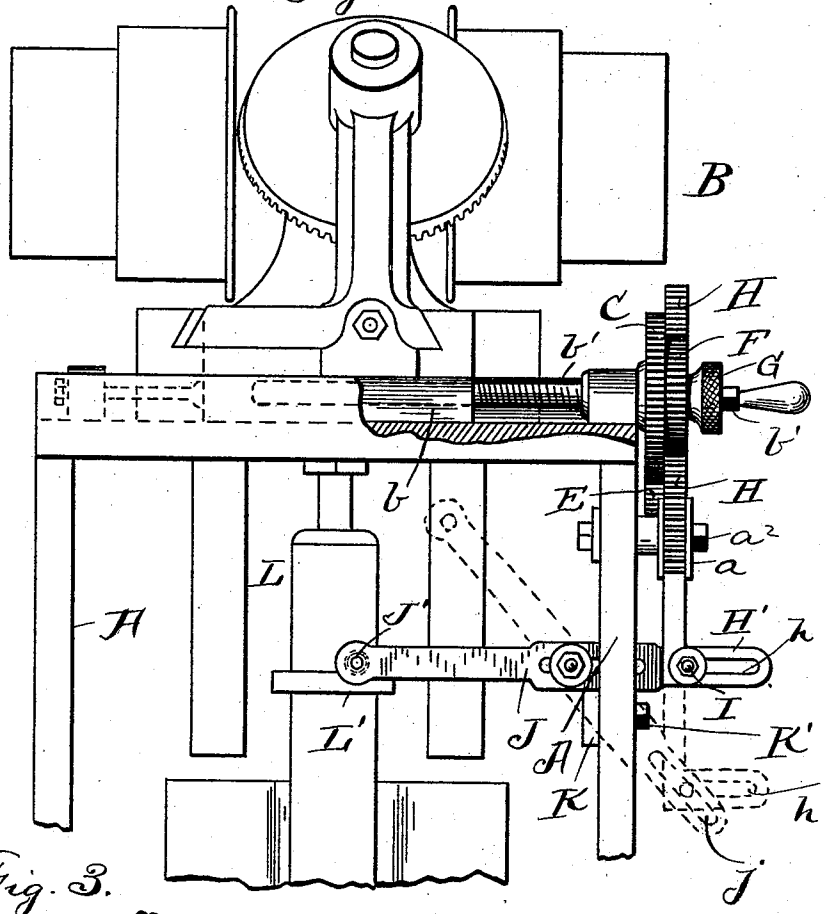


Fig. 3.

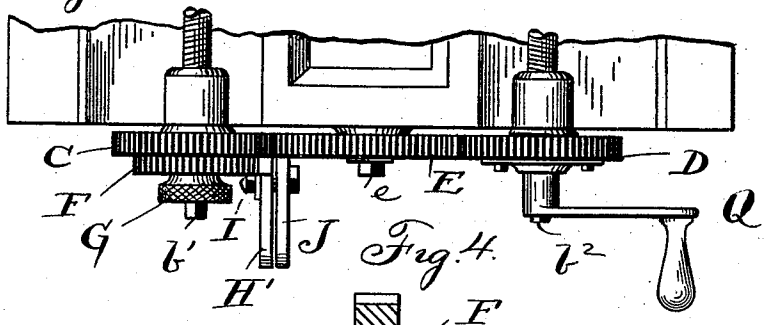
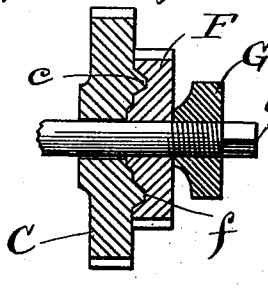


Fig. 4.



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E. Byron Gilchrist.

Inventor.
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By Lyon & Lyon
His attorneys

UNITED STATES PATENT OFFICE.

PETER HOENSCHEID, OF AKRON, OHIO, ASSIGNOR TO THE WHITMAN & BARNES MANUFACTURING COMPANY, OF SAME PLACE.

TWIST-DRILL-MILLING MACHINE.

SPECIFICATION forming part of Letters Patent No. 486,970, dated November 29, 1892.

Application filed December 31, 1891. Serial No. 416,635. (No model.)

To all whom it may concern:

Be it known that I, PETER HOENSCHEID, of Akron, in the county of Summit and State of Ohio, have invented certain new and useful Improvements in Twist-Drill-Milling Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use the same.

My invention relates to improvements in drill-milling machines, and more especially to the mechanism for adjusting the mills or cutters apart to effect a gradual decrease in the depth of cut during the milling operation, the object being to provide simple and comparatively inexpensive mechanism for obtaining said adjustment of the mills or cutters, to provide mechanism whereby both mills or cutters are simultaneously adjusted relative to the work or blank to be operated upon and simultaneously separated from the work subsequent to the operation, and also to provide mechanism for adjusting the mills or cutters independently of each other.

With this object in view my invention consists in certain features of construction and in combination of parts hereinafter described, and pointed out in the claims.

In the accompanying drawings, Figure 1 is a front side elevation of so much of a milling-machine embodying my invention as is considered necessary to illustrate my invention. Fig. 2 is a left-hand side elevation of the same. Fig. 3 is a plan view of my improved mechanism. Figs. 4, 5, and 6 are views in detail hereinafter more fully described, Figs. 4 and 5 being in section.

A represents the supporting-frame of the machine, and B B represent the blocks that carry the cutter-spindles and attached mills or cutters, said blocks being mounted on slides *b b*, extending from front to rear, said slides operating in corresponding slideways in the top of the supporting-frame, slides *b b* being provided with screws b' b^2, respectively right and left handed, screw b^2 in the present instance being the one that is left-handed. The shanks of screws b' b^2 extend forward and have mounted thereon outside the supporting-frame gears C D, respectively, and the supporting-frame has a forwardly-projecting stud *e*, upon which is mounted a gear E, that meshes with gears C D, gear C being rigidly mounted on the shank of screw b'. The shank of screw b', outside gear C, has loosely mounted thereon a pinion F, and terminates in a screw-threaded end for receiving a nut G. The opposing surfaces of gear C and pinion F are of such construction as to constitute a friction-coupling, being preferably provided, respectively, with an annular conical disk or elevation *c* and a corresponding groove or depression *f*, nut G being adapted to hold the parts in frictional contact.

H represents a rack adapted to reciprocate up and down in a way or guide *a*, with which the front side of the supporting-frame is provided. The front side of the supporting-frame is made in sections or slotted, as at a' A', and way or guide *a* is preferably adjustable endwise in slot a', being secured to the supporting-frame by screw-bolt a^2. Rack H terminates at its lower end in an outwardly or forwardly projecting arm H', that is loosely connected by means of a pin or bolt I with the weight end of a tilting arm or lever J, said end of lever or arm J being longitudinally slotted, as at *j*, to accommodate the movement of said lever. Arm H' of rack H is also longitudinally slotted, as at *h*, the slot being enlarged, as at h', and pin or bolt I is provided with a shoulder, as at *i*, said shoulder having preferably flattened sides to fit the enlarged portion h' of slot *h*. By means of slot *h* rack H is adjustable to operate more slowly or rapidly, according as it is desired to have the decrease in the depth of cut more or less abrupt, and by means of nut i', with which bolt I is provided, the rack is firmly held in its adjusted position. To the back of the front side of the supporting-frame is adjustably secured by means of slot A' and screw-bolt and interposed washer, as at K', a block K, and to this block is fulcrumed lever J, the power end of the latter, or a friction-roller J', with which said end is provided, being adapted to rest upon an annular shoulder or collar L' on spindle L, the latter being adapted to carry and rotate the drill-blank and feed the same upward past the cutters, the drill-blank having also bearing in a bush-

ing supported by the top of the supporting-frame.

The manner of supporting the drill-blank and mechanism employed in machines of this class for imparting a gradual upward and rotary motion to the spindle that carries the drill-blank, as aforesaid, are so well known that further description of them or illustration is not considered necessary.

From the foregoing description the operation of the mechanism for gradually adjusting the cutters or mills apart during the cutting operation to obtain the gradual decrease in the depth of cut will be readily understood. The cutters having been set the proper distance apart to commence work upon the drill-blank carried by spindle L, the latter is set in motion. Tilting arm or lever J is actuated by annular shoulder or collar L′ on the rotating and gradually upwardly-moving work-holding spindle, and gradually lowers rack H, that in turn imparts the motion to pinion F. Pinion F, being held in frictional contact with gear C by the means hereinbefore described, causes gear C to rotate therewith, and gear C transmits the motion through intermediate gear E to gear D, and hence it will be observed that by such construction both screws b' b^2 are simultaneously and equally revolved and caused to impart the desired motion to blocks or cutter-spindle carriers B to effect the gradual adjustment of the mills or cutters apart during the milling operation and producing the desired decrease in the depth of the grooves from the point toward the shank of the drill, and with the parts of the machine once properly adjusted it follows that with the construction aforesaid the work is done with the utmost accuracy. Upon the completion of the cutting and milling operation the movement of the work-holding spindle is automatically stopped, as in all machines of this class, and lowered by giving its driving mechanism (not shown) a reverse motion. Pinion F is disengaged from frictional contact with gear C and rack H is lowered, tilting arm or lever J to the position shown in dotted lines, Fig. 2, whereupon by operating screws b' b^2 to effect the separation of the mills or cutters from the milled drill the latter can readily be removed and a new blank inserted. Upon the insertion of the new blank the parts are returned to their proper adjustment for commencing operation on the new blank.

Gear D is loosely mounted on the shank of screw b^2 outside the supporting-frame, and consequently suitable mechanism is provided for locking said gear to the screw to cause the latter to revolve with the gear, and by preference I provide as follows: The shank of screw b^2 forward of gear D has rigidly mounted thereon a disk N, that is slotted, as at n, slots n being located, preferably, in the same circular plane and diametrically opposite. Gear D has screw-threaded holes that register with the respective slots n in disk N, and are adapted to receive bolts O, the latter being entered through said slots in disk N and having preferably mounted thereon a washer O′ between their heads and disk N. Gear D has preferably a centrally-located frusto-conical depression, as at D′, and disk N has a correspondingly-shaped portion, whereby gear D is adapted to partly embrace said disk, and hence upon tightening bolts O gear D may be brought into frictional contact with and locked to disk N, which, as aforesaid, is rigidly mounted on the shank-screw b^2, thus causing screw b^2 to be revolved with gear D as motion is transmitted to the latter by means of intermediate gear E. With such construction, if at any time there should be slight inaccuracy in the preliminary adjustment of the mills or cutters relative to the drill-blank to be operated upon by loosening bolts O, as required, to disengage gear D from frictional contact with disk N, screws b' b^2 can be revolved independently of each other to obtain accuracy in the adjustment of the mills or cutters, slots n in disk N accommodating such alteration in the adjustment of parts without necessitating the removal of bolts O, and by unscrewing nut G to disengage pinion F from gear C without disengaging pinion F and rack H the adjustment of screw b' can be effected without interfering with the adjustment of the rack and connected mechanism. The shanks of b' b^2 at their forward outer end are preferably square for receiving a crank, as at Q, for convenience in manipulating the screws.

It will readily be observed that by the construction hereinbefore described with screws b' b^2, connected with each other, and the parts having once properly been adjusted, and with crank Q, for instance, in position on the shank of the screw b^2, by manipulating said crank in the one direction or the other, according as a milled drill is to be removed or a new blank inserted, both mills or cutters can be simultaneously and with great facility adjusted as required and with infallible accuracy.

What I claim is—

1. In a drill-milling machine, the combination, wth a supporting-frame, cutter-spindle carriers, and a work or blank holding spindle, of screws connected with the cutter-spindle carriers and operatively connected with each other, a pinion loosely mounted on the shank of one of said screws, a rack adapted to operatively connect said spindle and work or blank holding spindle, and suitable mechanism for locking said pinion to the screw upon which it is mounted, substantially as set forth.

2. In a milling-machine, the combination, with a supporting-frame, cutter-spindle carriers, and a work or blank holding spindle, substantially as indicated, of screws conneted with the cutter-spindle carriers, gears mounted on the shanks of said screws and operatively connected with each other, a pinion loosely mounted on the shank of one of said

screws adjacent the gear aforesaid, a rack adapted to operatively connect said pinion and work or blank holding spindle, and suitable mechanism for locking said pinion to the adjacent gear, substantially as and for the purpose set forth.

3. In a milling-machine, the combination, with a supporting-frame, cutter-spindle carriers, and a work or blank holding spindle, substantially as indicated, of screws connected with the cutter-spindle carriers, gears mounted on the shanks of said screws and operatively connected with each other, a pinion loosely mounted on the shank of one of said screws adjacent the gear aforesaid, a rack adapted to operatively connect said pinion and work or blank holding spindle, and a nut mounted on the correspondingly-threaded portion of the shank of the respective screw forward of said pinion, and the opposing surfaces of said pinion and adjacent gear being such that upon tightening the nut aforesaid said pinion is brought into frictional contact with said gear and firmly held thereto, substantially as and for the purpose set forth.

4. In a milling-machine, the combination, with a supporting-frame and cutter-spindle carriers, of screws connected with the cutter-spindle carriers, gears mounted on the shanks of said screws and operatively connected with each other, one of said gears being loosely mounted on the respective screw and the latter adjacent said gear being provided with a rigid disk, and suitable mechanism adapted to lock said gear to the disk, substantially as and for the purpose set forth.

5. In a milling-machine, the combination, with a supporting-frame and cutter-spindle carriers, of screws connected with the cutter-spindle carriers, gears mounted on the shanks of said screws and operatively connected with each other, one of said gears being loosely mounted on the respective screw and the latter adjacent said gear being provided with a rigid disk, the disk being slotted, as at *n*, and the adjacent gear having bolts or securing devices, as at O, extending through said slots, the opposing surfaces of said gear and disk being such that upon the tightening of said bolts or securing devices said gear is brought into frictional contact with said disk and firmly held thereto, substantially as and for the purpose set forth.

In testimony whereof I sign this specification, in the presence of two witnesses, this 27th day of October, 1891.

PETER HOENSCHEID.

Witnesses:
C. H. DORER,
CHAS. BAIRD.