No. 676,197. Patented June 11, 1901.

A. MILL.

RADIAL DRILL.

(Application filed Oct. 26, 1900.)

(No Model.) 2 Sheets—Sheet 1.

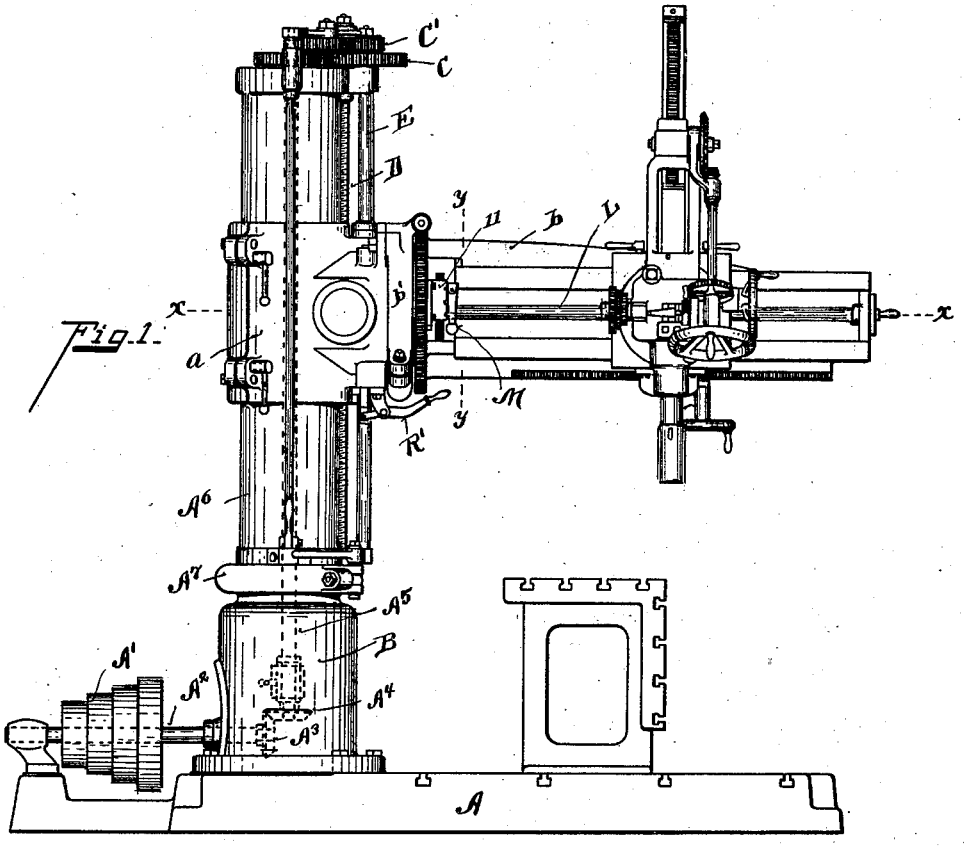

Fig. 1.

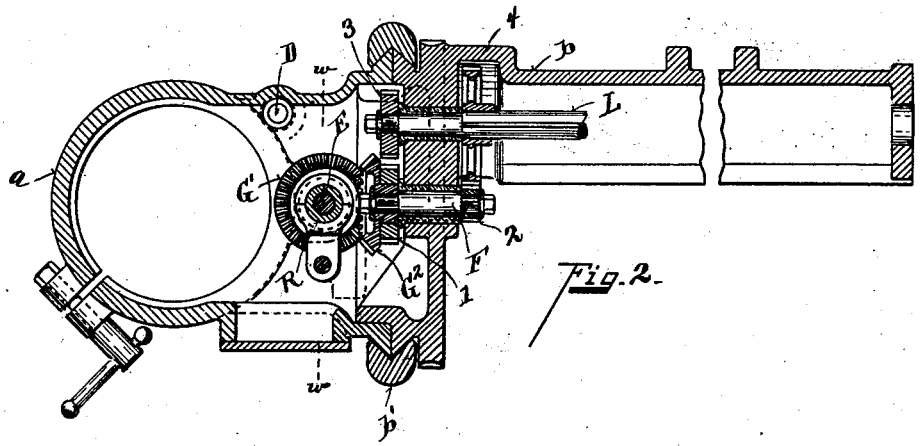

Fig. 2.

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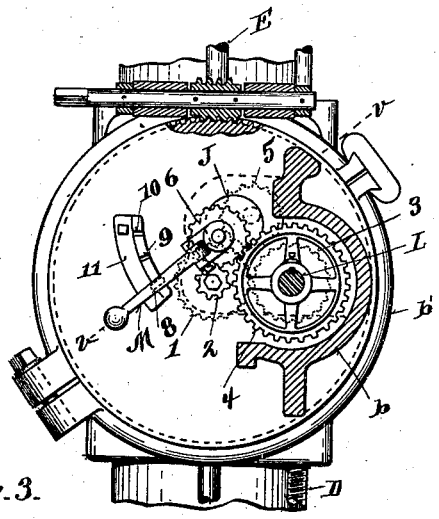

Fig. 3.

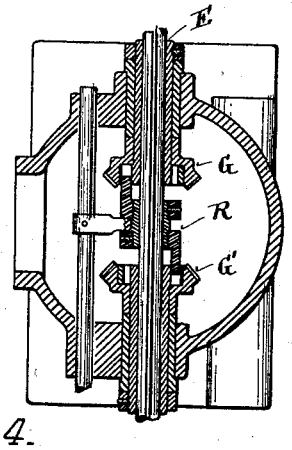

Fig. 4.

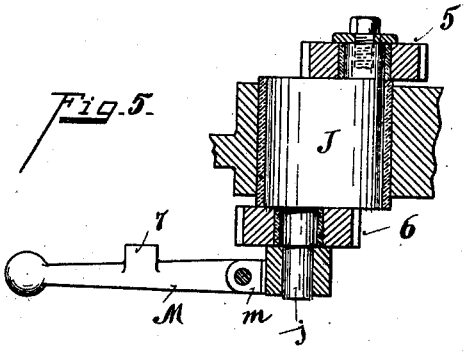

Fig. 5.

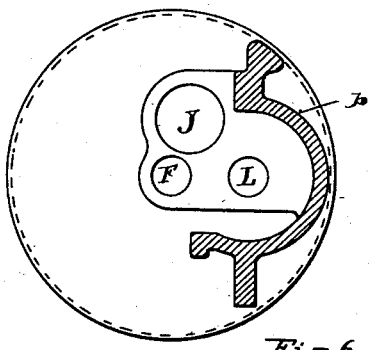

Fig. 6.

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UNITED STATES PATENT OFFICE.

ANTON MILL, OF CINCINNATI, OHIO, ASSIGNOR TO THE AMERICAN TOOL WORKS COMPANY, OF SAME PLACE.

RADIAL DRILL.

SPECIFICATION forming part of Letters Patent No. 676,197, dated June 11, 1901.

Application filed October 26, 1900. Serial No. 34,500. (No model.)

To all whom it may concern:

Be it known that I, ANTON MILL, a citizen of the United States, residing at Cincinnati, in the county of Hamilton and State of Ohio, have invented certain new and useful Improvements in Radial Drills, of which the following is a specification.

The object of my invention is to provide a speed-changing device for a radial drill employing a swiveling arm interposed between the transmitting-shaft on the main column and the driving-gear on the radial arm, whereby a variable speed may be obtained to drive the radial-arm shaft in the various positions it may occupy.

Other features of my invention will be more fully set forth in the description of the accompanying drawings, forming a part of this specification, in which—

Figure 1 is a side view of my improved drill. Fig. 2 is a section on line *x x*, Fig. 1, with the drill-head removed. Fig. 3 is a section on line *y y*, Fig. 1. Fig. 4 is a section on line *w w*, Fig. 2. Fig. 5 is a sectional view on line *v v*, Fig. 3, of the shifting levers and the reversible gears mounted upon an eccentric. Fig. 6 is a plan view showing the arrangement of shafts of a variable-speed gear shown in Fig. 3.

A represents the base or bed plate of the machine; A′, a cone of driving-pulleys on shaft A^2; A^3, a bevel-gear on said shaft for transmitting motion to a bevel-gear A^4 on the vertical shaft A^5, preferably journaled centrally within the main column A^6.

B represents the base of the column; A^7, the clamping-yoke forming the lower journal-bearing for the tubular column on which the radial-drill arm is journaled.

a represents the journaled sleeve on which is supported the radial arm.

b represents the radial arm proper, swiveled upon the sleeve-arm *a* and clamped thereto by means of the ring *b*′.

C represents a train of gears for transmitting power from the central vertical shaft to the driving-shaft E, and C′ represents a train of gears for transmitting power to the screw-shaft D, which raises and lowers the radial-drill arm. These parts are preferably constructed in the manner shown in my previous application, filed October 20, 1900, Serial No. 33,694; but any form of transmitting-gears may be employed in lieu thereof.

In the accompanying drawings, G G′ represent reversing bevel-gears mounted upon shaft E.

R represents a right and left hand clutch member operated by the shifting lever R′ to clutch either of the gears G and G′ to the driving-shaft for the purpose of reversing the motion. The features in this clutch of reversing mechanism are not claimed herein, being claimed in my said prior application.

It is desirable in radial drills to employ speed-changing gears, so as to vary the motion of the drill-spindle, and it is also desirable to have speed-changing devices interposed between the driving-shaft journaled on the column of the drill and the shaft on the radial arm, so that the operator can change the speed by regularly shifting the levers mounted upon the radial arm, and it is also desirable to arrange these speed changers so that the speed may be changed while the drill is in operation. I accomplish these results in the following manner: F represents a stud-shaft carrying a bevel-gear G^2, which engages with either the left or right hand bevel-gears G G′, mounted on the driving-shaft E. Upon stud-shaft F are mounted two gears—1, a gear in the rear of bevel-gear G^2, and 2 a smaller transmitting-gear on the outer end of said shaft—and these two gears are alternate transmitters for conveying power to the radial arm on shaft L. Upon radial-arm shaft L are likewise mounted gear 3 and gear 4.

In order to obtain the fast speed, I provide two sets of shifting transmitting-gears, as follows: J represents a tumbler-shaft journaled in the head of the radial arm *b*. Said tumbler-shaft J carries gears 5 and 6. When said tumbler-shaft is turned in one direction, gear 5 is brought into mesh with gears 1 and 3, which transmit fast speed to the shaft L. When the tumbler-shaft is turned to the extreme opposite direction, it brings gear 6 into mesh with gears 2 and 4, and thereby transmits a slower motion with increased power to said shaft L.

For convenience of operation a shipping-le-

ver M is shown as clamped upon the stud-shaft 3 of gear 6. It is provided with a hinge-joint *m* and a lug 7, adapted to engage in notches 8, 9, and 10 of the segment-plate 11, so that when said shipping-lever is engaged in the center notch 9 radial-arm shaft L is idle; but when the lever is shifted to the right or left it can be locked in position to obtain either fast or slow speed, as desired, and thereby increase or decrease the power employed.

R′ represents a shipping-lever journaled upon the sleeve which supports the radial arm and connected to the reversing-shaft which operates right and left hand clutch for reversing the motion to the shaft L of the radial arm, and thereby the drill-spindle. It will be observed that the shipping-lever M for changing the speed is mounted upon the swiveling radial arm and both are in convenient reach of the operator, so that he may reverse the motion which is required in tapping and may readily change the speed from fast to slow, or vice versa, as the case requires. It will also be observed that by throwing either of these two levers into central or neutral position the revolution of the drill-spindle is stopped. I believe I am the first to accomplish this result by shipping-levers mounted upon the radial arm.

Having described my invention, I claim—

1. In a radial drill, a driving and a driven shaft, arranged parallel, a pair of driving gear-wheels on the driving-shaft, a pair of driven gear-wheels on the driven shaft, arranged respectively opposite to the said driving gear-wheels, two of said gear-wheels being of different diameter, a lever, a pair of transmitting gear-wheels eccentrically journaled on said lever and adapted to be alternately intermeshed with the oppositely-arranged driving and driven gear-wheels when the lever is turned, substantially as specified.

2. In a radial drill, a driving and a driven shaft arranged parallel, a pair of driving gear-wheels on the driving-shaft, a pair of driven gear-wheels on the driven shaft, two of said gear-wheels being of different diameter, the driving gear-wheels being placed respectively opposite to the driven gear-wheels, a lever, a pair of transmitting gear-wheels eccentrically journaled on said lever adapted to be alternately intermeshed with the oppositely-arranged driving and driven gear-wheels when the lever is turned to extreme opposite positions, and to be disengaged from both when the lever is in neutral position, substantially as specified.

3. In a radial drill, a driving and a driven shaft arranged parallel, a pair of driving gear-wheels on the driving-shaft, a pair of driven gear-wheels respectively placed opposite on the driven shaft, two of said gear-wheels being of different diameter, a lever, a pair of transmitting gear-wheels eccentrically journaled on said lever and adapted to be alternately intermeshed with said oppositely-placed driving and driven gear-wheels respectively, and means for locking said lever in either position of engagement or in position of disengagement, substantially of specified.

In testimony whereof I have hereunto set my hand.

ANTON MILL.

Witnesses:
OLIVER B. KAISER,
EMMA MILL.