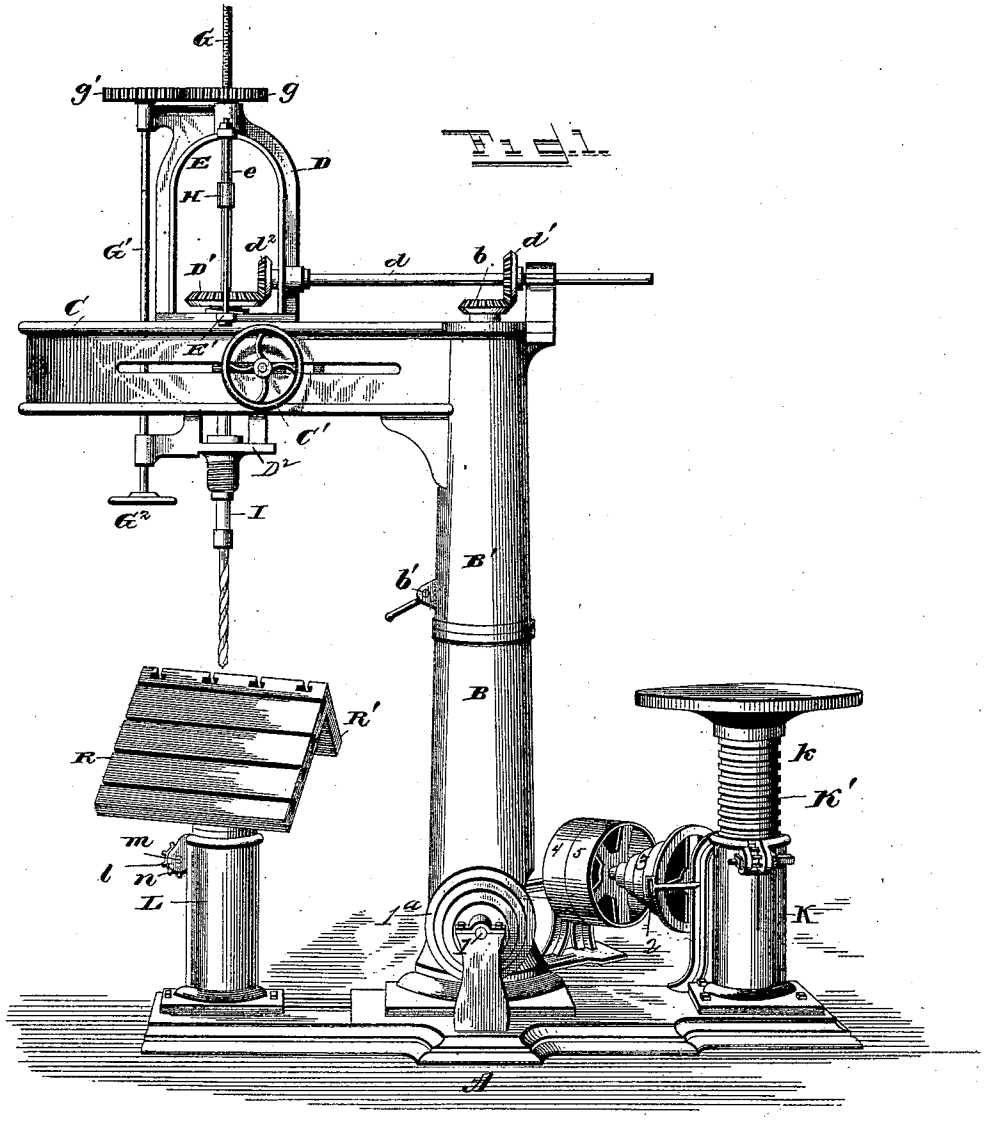
(No Model.) 3 Sheets—Sheet 1.

J. J. BATMAN.

RADIAL DRILL.

No. 395,943. Patented Jan. 8, 1889.



WITNESSES

L. S. Elliott,

E. M. Johnson

John J. Batman

INVENTOR

by

Attorney

(No Model.) 3 Sheets—Sheet 2.

J. J. BATMAN.

RADIAL DRILL.

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Fig. 2.

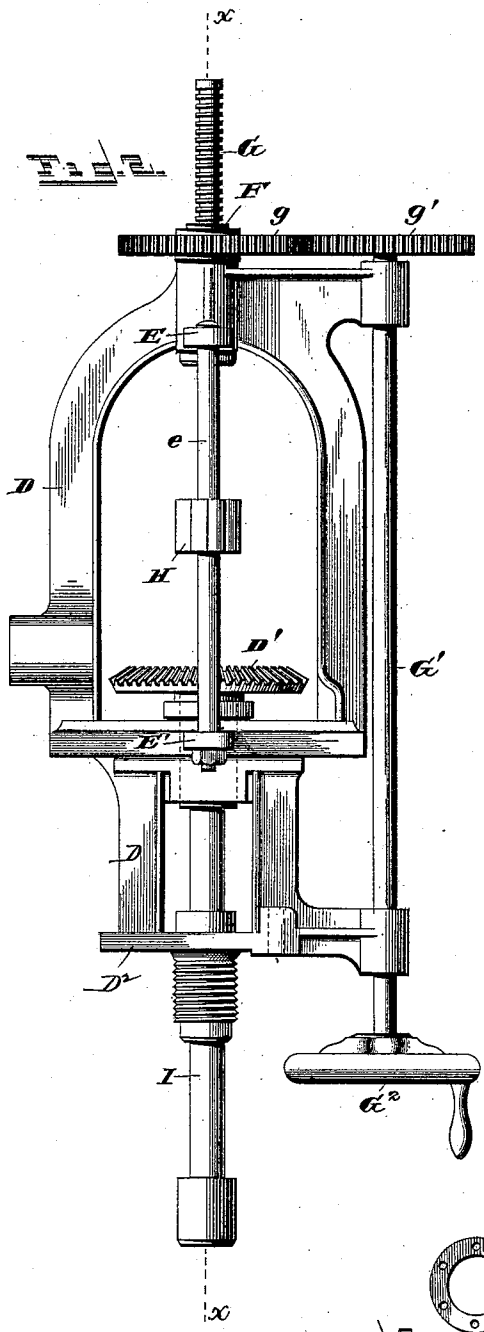


Fig. 3.

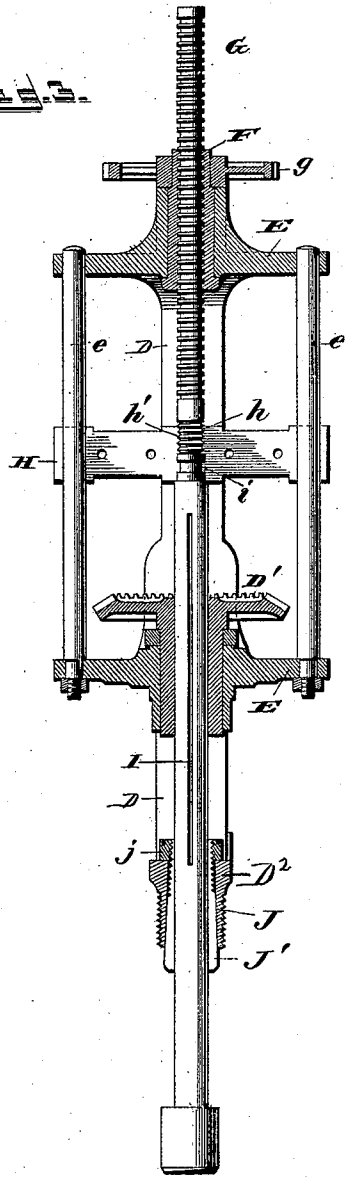
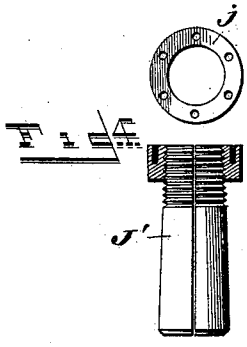


Fig. 4.



WITNESSES.

L. S. Elliott.

C. M. Johnson

John J. Batman

INVENTOR

by Munn & Co

Attorney.

(No Model.) 3 Sheets—Sheet 3.

J. J. BATMAN.

RADIAL DRILL.

No. 395,943. Patented Jan. 8, 1889.

Fig. 5.

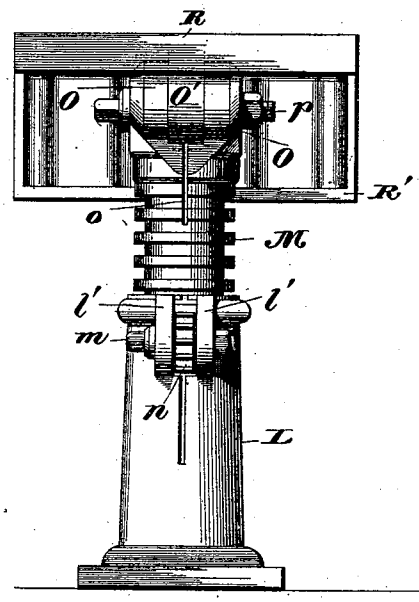
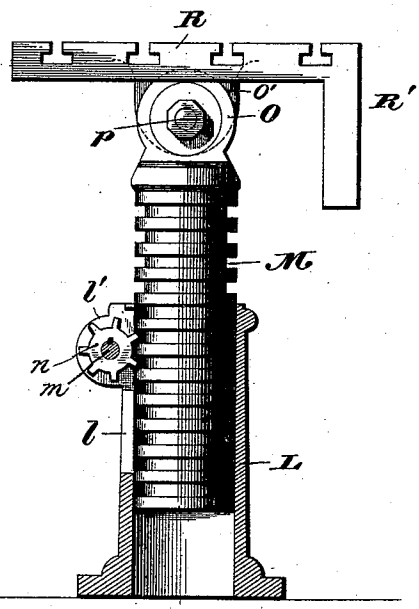


Fig. 6.



WITNESSES

G. S. Elliott.

E. M. Johnson

John J. Batman.

INVENTOR

by

Attorney

UNITED STATES PATENT OFFICE.

JOHN J. BATMAN, OF SUNBURY, PENNSYLVANIA.

RADIAL DRILL.

SPECIFICATION forming part of Letters Patent No. 395,943, dated January 8, 1889.

Application filed October 4, 1888. Serial No. 287,147. (No model.)

To all whom it may concern:

Be it known that I, JOHN J. BATMAN, a citizen of the United States of America, residing at Sunbury, in the county of Northumberland and State of Pennsylvania, have invented certain new and useful Improvements in Radial Drills; 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 appertains to make and use the same, reference being had to the accompanying drawings, and to letters or figures of reference marked thereon, which form a part of this specification.

My invention relates to certain new and useful improvements in radial drills, the object of the same being to provide means whereby the wear which is caused by the rotary motion of the spindle may be taken up and the table adjusted so that it can be moved and held vertically or placed at an angle with the drill; and my invention consists in the construction and combination of the parts, as will be hereinafter fully set forth, and specifically pointed out in the claims.

In the accompanying drawings, Figure 1 is a perspective view of a radial drill constructed in accordance with my invention. Fig. 2 is a side view of the drill-stock detached. Fig. 3 is a vertical section through the drill-stock. Fig. 4 is a detail view. Fig. 5 is a side view of the tilting table and its support, and Fig. 6 is a sectional view of the same.

A refers to a platform, to which the fixed post or column B is rigidly secured. Above the column and to the same is suitably secured, so as to turn thereon, a column, B′, which carries a horizontal arm or overhanging beam, C. This beam or arm C is provided with a horizontal slot, through which passes a shaft carrying a pinion and hand wheel for engaging with a rack-bar, so as to move the drill-frame D. Through the columns B and B′ passes a vertical shaft, which carries at its upper end a beveled wheel, *b*, the lower end of this shaft being also provided with a beveled wheel, which engages with a corresponding wheel on the countershaft 1, supported by bearings attached to the column B and to the platform. This countershaft is provided with a cone-pulley, 1^a, over which the driving-belt passes, said belt passing through a belt-guide, 2, so as to be guided over the conical pulley 3, which is at an angle with the pulley hereinbefore mentioned. Upon the shaft of the last-mentioned pulley are secured loose and fast pulleys 4 and 5.

The lower portion of the column B′ may be split and provided with outwardly-projecting ears *b′*, through which a screw-threaded rod passes, so that it may be contracted to jam the movable column upon the stationary one beneath.

The drill-frame D is secured by any suitable means to the arm C, so as to be moved horizontally thereon, either to or from the supporting-column, by turning the hand-wheel C′, and a rotary motion is communicated to the drill by means of the shaft *d*, which carries pinions *d′* and d^2, the pinion *d′* being provided with a key, which engages with a longitudinal groove in the shaft *d*. This shaft *d* is mounted in suitable bearings, as shown, and the pinion d^2 engages with a pinion, D′, which embraces the spindle, said spindle being arranged to move longitudinally within the hub of the pinions, but to rotate with it.

The drill-frame D is provided with laterally-projecting arms E and E′, connected to each other by guide-rods *e e*, which are clamped securely to the lower arms, E′, and are also made fast to the upper arms, E. At the center of these arms of the drill-frame openings are provided, in the lower one of which the hub of the beveled gear-wheel D′ is journaled, while in the upper opening an internal screw-threaded bushing or feed-nut, F, is seated, with which the threads of the feed-screw G engage. The upper portion of this feed-nut is key-ended, and to the same is secured the pinion *g*, with which engages a pinion, *g′*, attached to the vertical shaft G′, which is supported in bearings formed on the drill-frame, the lower end of this shaft being below the arm C and there provided with a hand-wheel, G^2.

Upon the rods *e e* is secured a sliding cross-head, H, which is made up of two corresponding side pieces securely bolted to each other, so as to move vertically upon the guide-rods *e e*. Centrally this cross-head H is provided with threaded socket *h*, with which the threads on the lower end, *h′*, of the feed-screw G engage.

The threads on the lower end of the feed-screw are much finer than the threads on the body portion of said screw, and also have a different pitch. Beneath the screw-threaded recess *h*, and communicating with it, is a recess, *i*, provided with an inwardly-projecting annular shoulder to engage an annular groove formed in the upper end of the spindle I. This spindle, as before stated, passes freely through the hub of pinion D′, and is provided with a longitudinal groove to receive a feather or spline formed in the bore of the hub, whereby the spindle has longitudinal movement in the hub, but is rotated by it. The lower cross-piece, D^2, of the drill-frame is provided centrally with a vertical conical opening or socket, J, within which is seated a long split sleeve, J′, cone-shaped exteriorly, and threaded at its upper end to receive an adjusting-nut, *j*. This sleeve J′ forms the lower bearing for the drill stock or spindle I, and may be adjusted vertically within its socket J by means of the nut *j* to take up wear.

The drill or boring-tool is clamped by a suitable chuck to the lower end of the spindle in the usual manner.

The platform A is provided at one end with a stationary column, K, which carries a vertically-movable table, said table being rigidly attached to a movable column, K′, which is provided with circumferential horizontal grooves *k*′, and with these a pinion supported by outwardly-projecting lugs formed on the column K engages, by means of which pinion the table can be adjusted vertically and turned horizontally, as desired. The means for adjusting vertically and securing the same in position are the same as that employed on the movable table, which will be hereinafter described.

L refers to a column, which can be moved horizontally upon the platform A to and from the stationary column B, the same being adapted to be clamped in position upon the platform when adjusted. This column L is provided with a slot, *l*, and with outwardly-projecting ears *l*′, which form bearings for a rectangular shaft, *m*. One end of this shaft is key-ended and provided with a suitable collar, and upon the rectangular portion between the ears *l*′ a pinion, *n*, is placed. The opposite outer end of the shaft supporting this pinion is screw-threaded and provided with a nut.

The stem or column which supports the table is provided with a series of horizontal flanges and recesses, with which the pinion *n* engages, and the upper portion of this column or shaft M is slotted, as shown at *o*, and provided with a cut-away central portion, which provides side ears, O O, between which a depending lug, O′, formed on the under side of the table lies. One of the outer ends of the bolt *p*, which passes through the ears and lug O′, is key-ended and provided with a collar, while the opposite end is screw-threaded and provided with a nut.

The table R is provided with a right-angular portion, R′, formed integral therewith, and this table is provided with slots for attaching clamps for holding the work in position thereon.

By the construction hereinbefore described it will be observed that by loosening the nut on the pinion-carrying shaft or bolt *m*, ears *l*′ will spring apart, and then by using a wrench upon the key-ended portion of said bolt or shaft the pinion *n* can be turned to raise the column or stock M, and by again tightening the nut the column M, to which the table R is attached, will be held against the vertical movement, and by simply loosening the nut on the shaft *p*, Figs. 5 and 6, the table can be adjusted to a desired angle.

In practice there is considerable wear upon the spindle I, which carries the drill, and to take up this wear and avoid lost motion the conical sleeve J′ can be adjusted to take up said wear upon the lower bearing of the spindle, and the wear on the head of the spindle is taken up by the fine screw-threads formed on the lower end, *h*′, of the feed-screw; and it will be observed that the feed-screw is always held in contact with the upper end of the spindle, and by loosening four small cap-screws in cross-head H the feed-screw G can be screwed down to take up any vertical wear that may have occurred.

By supporting the spindle as herein shown the weight of the spindle and parts attached thereto will not come upon the drill, which permits the smallest class of drills to be employed without liability of the same being broken.

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

1. In a radial drill, the combination of a table having circumferential grooved column or stock M, the upper end of which is bifurcated and provided with a clamping-bolt, *p*, for securing the table of said column or stock, and a slotted support, L, for said column or stock, carrying a shaft, *m*, with pinion *n*, and a nut on said shaft for jamming the support upon the stock, substantially as shown, and for the purpose set forth.

2. In a drill, the combination of the drill-frame D, constructed substantially as shown and provided with a movable guide, H, having a central recess, within which the upper end of the spindle lies, and a screw-threaded recess, *h*, above the recess for the spindle, with which the lower end, *k*′, of the feed-screw engages, so as to bear upon the upper end of the spindle, substantially as shown, and for the purpose set forth.

3. The combination, in a drill, of the drill-frame provided with upper and lower bearings for the spindle, the lower opening, J, of said drill-frame being conical and provided

with a conical split sleeve, J′, the upper portion of which is screw-threaded, and a nut, *j*, for tightening and holding said sleeve in place, substantially as shown, and for the purpose set forth.

4. The combination, in a drill, of a drill-stock constructed substantially as shown and provided with guide-rods *e e*, the transverse bar made of two corresponding parts bolted together, so as to embrace said guide-arms and the upper portion of the spindle, and a feed-screw having the lower end provided with threads, which engage with the screw-threads in the arms H H, said threads being of different pitch from the feed-threads, substantially as shown, and for the purpose set forth.

5. The combination, in a drill, of a drill-stock constructed substantially as shown and provided with laterally-projecting arms E and E′, guide-rods *e e*, supported thereby, removable cross-bar mounted on the guide-rods and carrying centrally the upper end of the spindle and lower end of the feed-screw, a lower bearing for the spindle carrying a conical sleeve, through which the spindle passes, a driving-wheel, D, for rotating the spindle, and a shaft, G′, carrying a pinion, *g′*, which engages with a pinion, *g*, for turning the feed-screw, the parts being organized substantially as shown, and for the purpose set forth.

6. The combination, in a drill, of a table support or column provided with circumferential grooves, a support for said column having a vertical slot, adjacent to which are provided outwardly-projecting ears forming bearings for a bolt or shaft, upon which is placed a pinion, which engages with a support, said shaft having a nut for clamping the parts together, so as to be in frictional contact, substantially as and for the purpose set forth.

In testimony whereof I affix my signature in presence of two witnesses.

JOHN J. BATMAN.

Witnesses:
P. A. MAHON,
A. J. GUFFY.