No. 756,678. PATENTED APR. 5, 1904.

A. MILL.

DRILL.

APPLICATION FILED SEPT. 8, 1902.

NO MODEL.

Fig. 1.

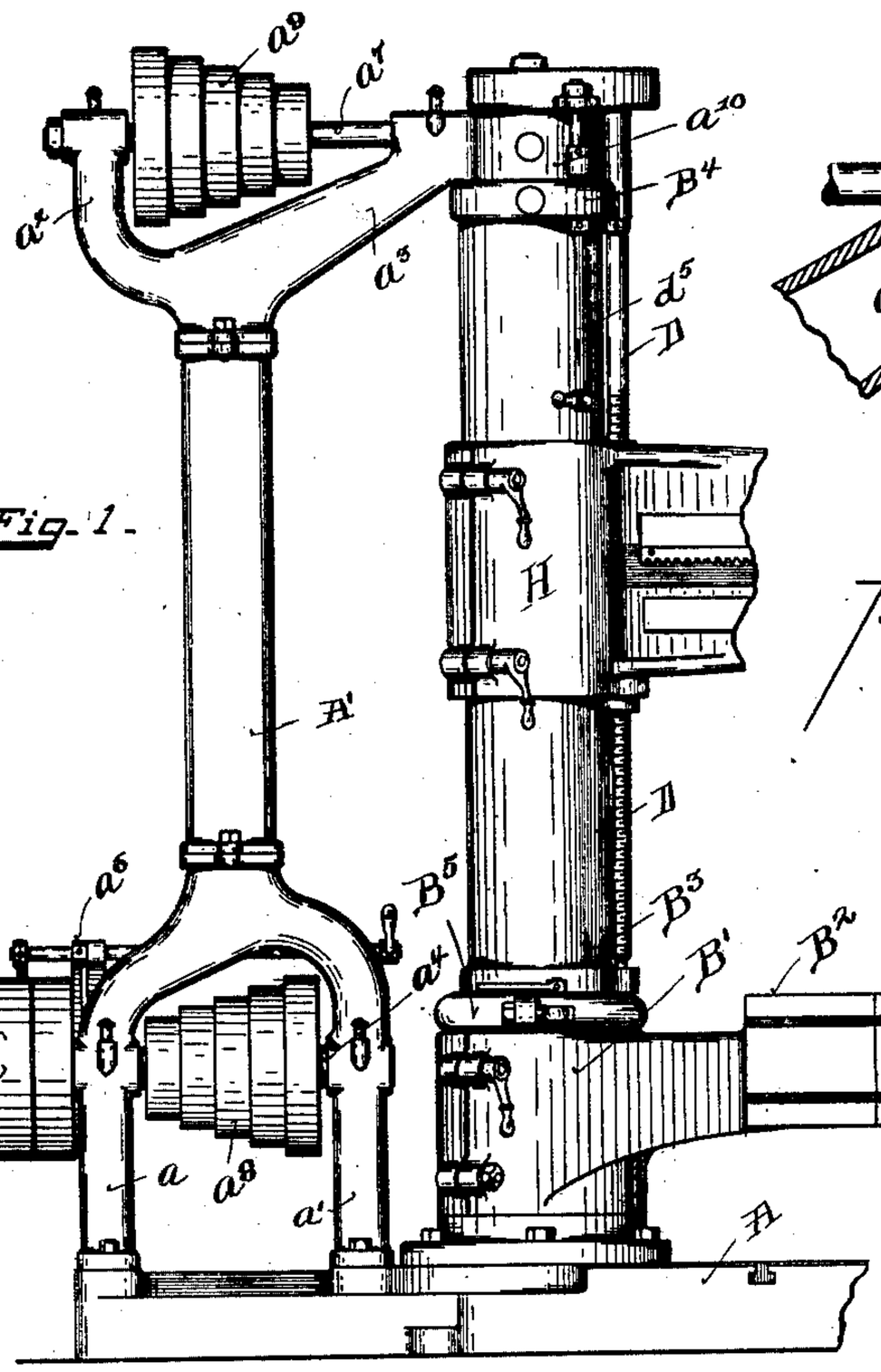


Fig. 2.

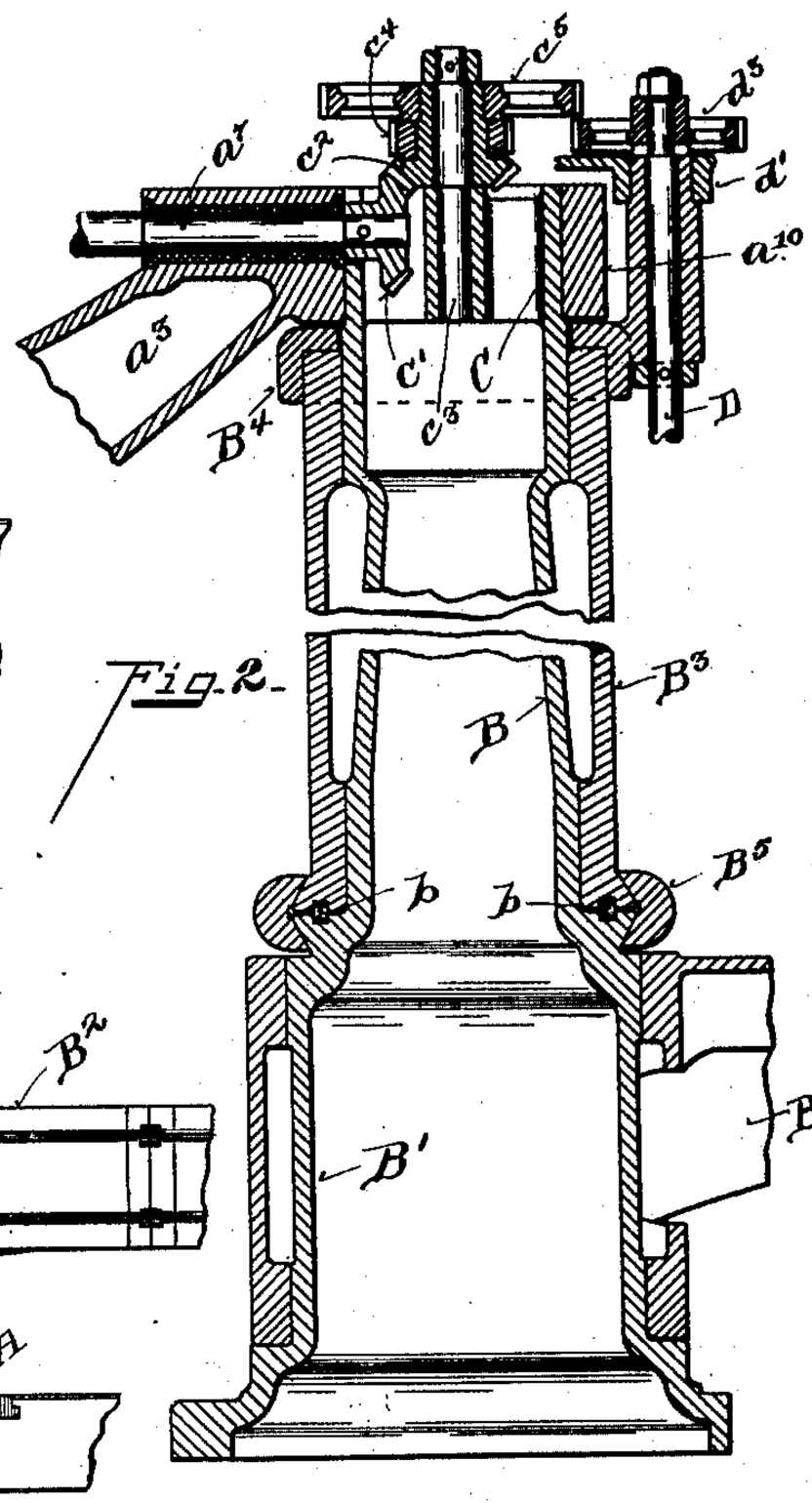


Fig. 3.

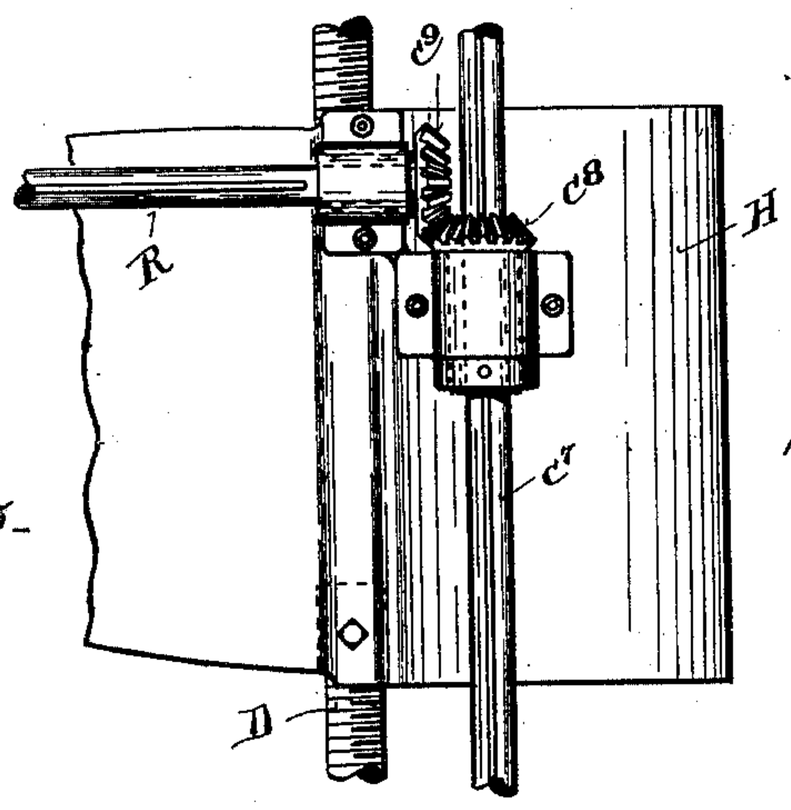
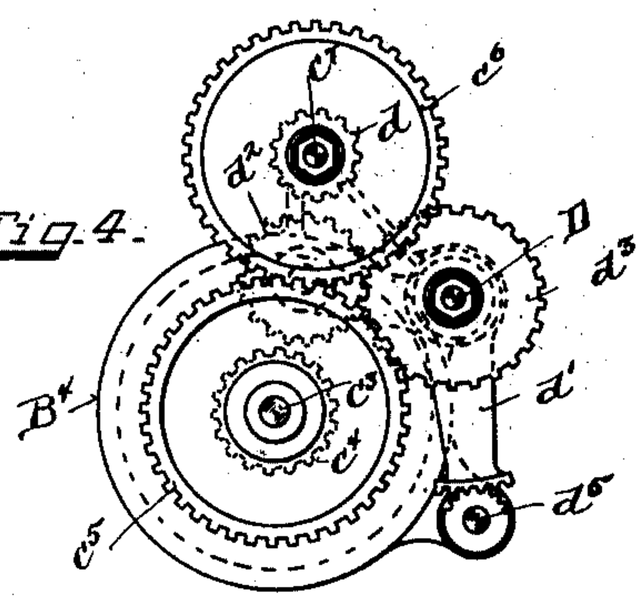


Fig. 4.



Inventor:

Witnesses:
Oliver E. Kaiser
Ida J. Lucas

By Anton Mill
Wood & Wood.
Attorneys

No. 756,678. Patented April 5, 1904.

UNITED STATES PATENT OFFICE.

ANTON MILL, OF CINCINNATI, OHIO, ASSIGNOR OF ONE-HALF TO CHRISTIAN ROOS, OF CINCINNATI, OHIO.

DRILL.

SPECIFICATION forming part of Letters Patent No. 756,678, dated April 5, 1904.

Application filed September 8, 1902. Serial No. 122,472. (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 Drills, of which the following is a specification.

My invention relates to an improvement in radial drills.

One of the objects of my invention is to relieve the tubular column of the drill from the strains of the main driving mechanism, which is incident thereto when the central column is used as the main support for the driving mechanism, thereby preventing the deflection of the column, which is apt to cause the tubular revoluble column to bind. By my improvement I obtain a free revoluble column upon which the radial arm is supported.

The various features of my invention are more fully set forth in the description of the accompanying drawings, forming a part of this specification, in which—

Figure 1 is a side elevation of the main and revoluble columns. Fig. 2 is an enlarged central vertical section of the revoluble and supporting column shown in Fig. 1, but with the cap or casing housing in the gears on the top of the column removed. Fig. 3 is a detail view of the means for transmitting motion from the driving-shaft journaled within the main column to the driving-shaft journaled on the radial arm. Fig. 4 is a top plan view of the gears shown in Fig. 2.

A represents the base of the machine.

A′ represents an upright braced column or frame on which is mounted the main power driving mechanism, the preferred form of construction having two limbs $a\,a'$ and two limbs $a^2\,a^3$ at the top, between which limbs the variable-speed mechanism is mounted, and the limbs serving as a journal-support for the said driving mechanism.

a^4 represents the main shaft. a^5 represents the power-pulleys mounted thereon; a^6, the belt-shifters.

a^7 represents the power-transmitting shaft journaled to the limbs at the top of the frame or column.

I have shown the variable-speed devices for transmitting motion from the main shaft a^4 to shaft a^7 as ordinary cone-pulleys a^8 and a^9; but any well-known variable-speed devices may be substituted for these.

B represents the column; B′, the base thereof, which is mounted on the base-plate A.

B^2 represents the table, which is clamped to the base B′ in the usual manner.

B^3 represents the revoluble column. This column is supported at the top by a journal-cap B^4 and at the base by a clamping-ring B^5. The revoluble column is shown as supported on antifriction-rollers b.

C represents the top of the central column, which extends above the revoluble tubular column, and it is clamped to the upright power frame or column A′ by means of a neck a^{10}. By making an independent power-frame and by rigidly mounting the central column on the same base and bracing these two upright columns or frame-pieces rigidly together at the top a very firm frame is obtained and the central column is secured in a true vertical position and forms a very efficient journal for the tubular column carrying the radial arm. As the radial arm supports the drill-spindle and cutting-tools, which are some distance removed from the central column, the power-frame or column being made separate and the two rigidly connected together at the top and bottom also makes a complete brace or support against the working strains on the radial arm, relieving the radial arm from tremors, which are apt to occur in the ordinary construction.

Shaft a^7 is armed with a bevel-gear c', meshing with bevel-gear c^2 on stud-shaft c^3. In the preferred form of construction gear c^2 is provided with a sleeve, to which sleeve are rigidly secured spur-gears c^4 c^5. Gear c^5 meshes with gear c^6, which is mounted on shaft c^7. (See Fig. 4.) Upon shaft c^7 is feathered a bevel-gear c^8, so as to allow the same to slide up and down on said shaft, which is journaled to the radial arm H. Bevel-gear c^8 meshes with bevel-gear c^9, which is secured to the driving-shaft R, suitably journaled upon the radial arm.

D represents the screw-shaft journaled out-

side of the column and having thread engagement with the radial arm, so as to raise and lower the same, which is accomplished in the following manner: d represents a spur-gear on shaft c^7, which is the primary transmitter of motion to the screw-shaft for raising the same. d' represents a bell-crank tumbler-arm, on the inner end of which is mounted a spur-gear d^2. When this arm is shifted so as to bring spur-gear d^2 into mesh with spur-gear d, motion will be transmitted to gear d^3, which is mounted on top of the screw-shaft D, and this engagement turns the screw in the proper direction for raising the radial arm. When it is desired to lower the radial arm, the tumbler-arm is shifted so as to bring spur-gear d^2 into mesh with gear c^4. Then motion is transmitted from gear c^4 to gears d^2 and d^3. d^5 represents the shifting-rod, at the top of which is a segment-gear meshing with the segment-gear on the tumbler-arm for operating the tumbler-lever.

Motion is transmitted from shaft a^7 to shaft c^7 and thence to shaft R, which I term the "radial-arm shaft."

By the construction herein shown and described a universal drill is provided of great power and rigidity.

The solid base-plate A, with the vertical supporting-column A' and the tubular work-column B, secured together at the top, forms a very rigid structure. The revoluble sleeve B^3, journaled on the work-column B and carrying the radial arm H, is supported with great firmness. These two vertical columns are joined at the top by the lateral arm a^3 of the supporting-column, which arm has at its end a powerful integral collar a^{10}, firmly encircling the work-column B. By this construction the driving-shaft a^7 of the supporting-column A' is made to journal in the arms a^2 a^3 thereof, projected through collar a^{10} and into the interior of the tubular work-column B. This construction also enables the journaling of a short stud-shaft c^3 within the top of the tubular work-column B, upon which stud-shaft are mounted the transmitting-gears between the driving-shaft of the supporting-column and the feed-shaft and the screw-shaft of the revoluble sleeve B^3. Thus it is obvious that although the vertical tubular work-column B B' supports the revoluble sleeve, making a universal drill, nevertheless it does not require one or more long shafts within the column B from top to bottom. By this construction and arrangement the power is transmitted in the shortest line possible from the driving-shaft to the feed-shaft and feed-screw supported on the revoluble sleeve, and this short line of transmission is securely braced by the lateral arm connecting the two vertical columns. The simplicity and strength of this arrangement is of great importance, as it gives all the advantages of a universal drill without sacrificing anything of the power and rigidity of the tool, but, on the contrary, greatly augmenting the possibility of the tool in these particulars.

Having described my invention, what I claim is—

In a radial drill, a base, a vertical supporting-column and a vertical tubular work-column thereon, a vertical sleeve journaled on said work-column, a radial arm on said sleeve, an arm laterally extended from the top of the supporting-column, a collar on the end of said arm encircling said work-column, a driving-shaft journaled horizontally within said arm of the supporting-column, and extending into the tubular work-column, and means operated by said shaft for actuating the drill-operating parts, and for raising and lowering said arm, substantially as specified.

In testimony whereof I have hereunto set my hand.

ANTON MILL.

Witnesses:
OLIVER B. KAISER,
IDA J. LUCAS.