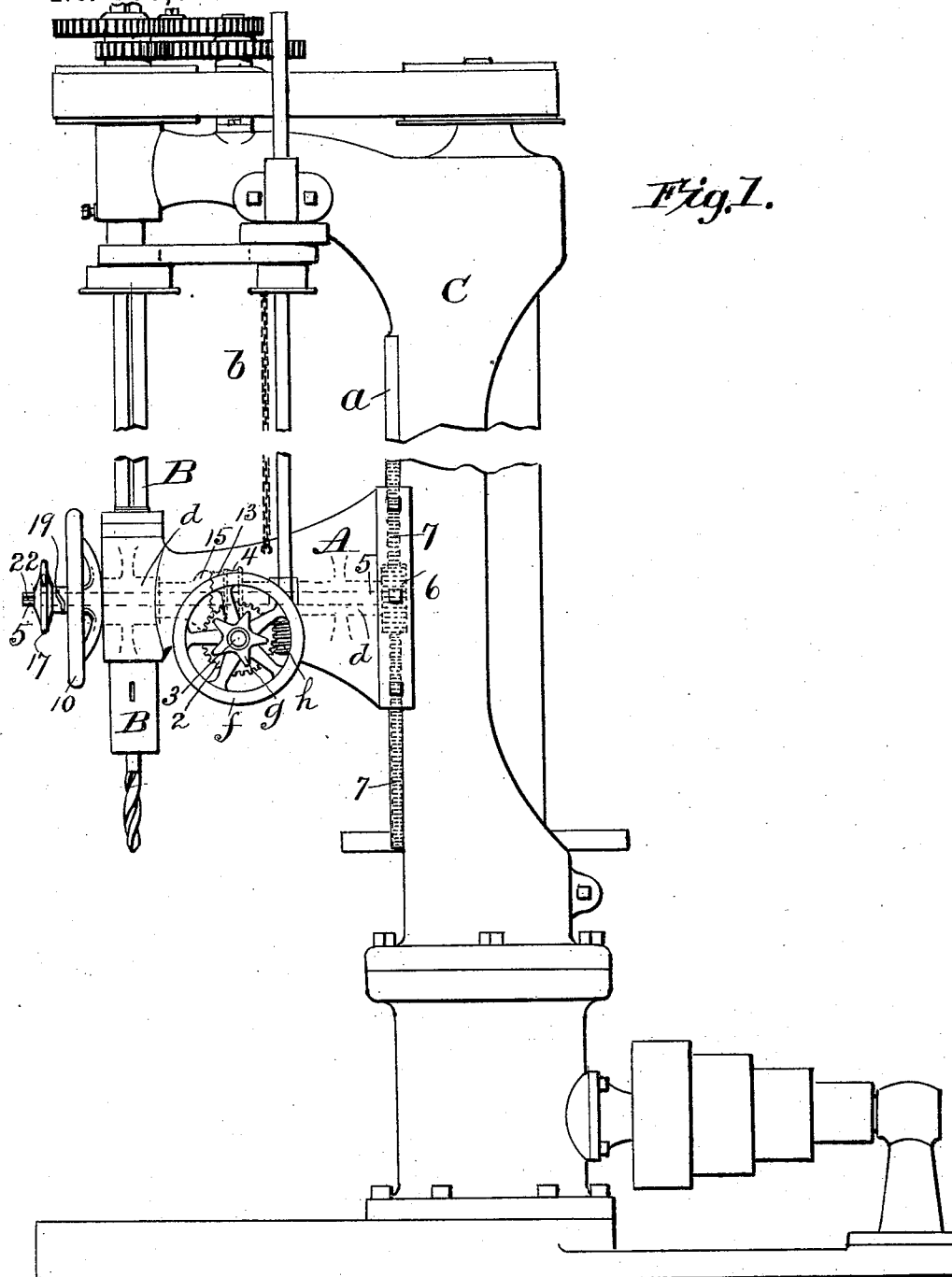


4 Sheets—Sheet 1.

HEAD OPERATING MECHANISM FOR THE TOOL SPINDLES OF DRILLING
MACHINES, &c.

No. 466,553.

Patented Jan. 5, 1892.



Witnesses:

J. W. Garfield
G. W. Chamberlain

Inventor,

S. H. Baugh
by Chapman &
Attorneys

(No Model.)

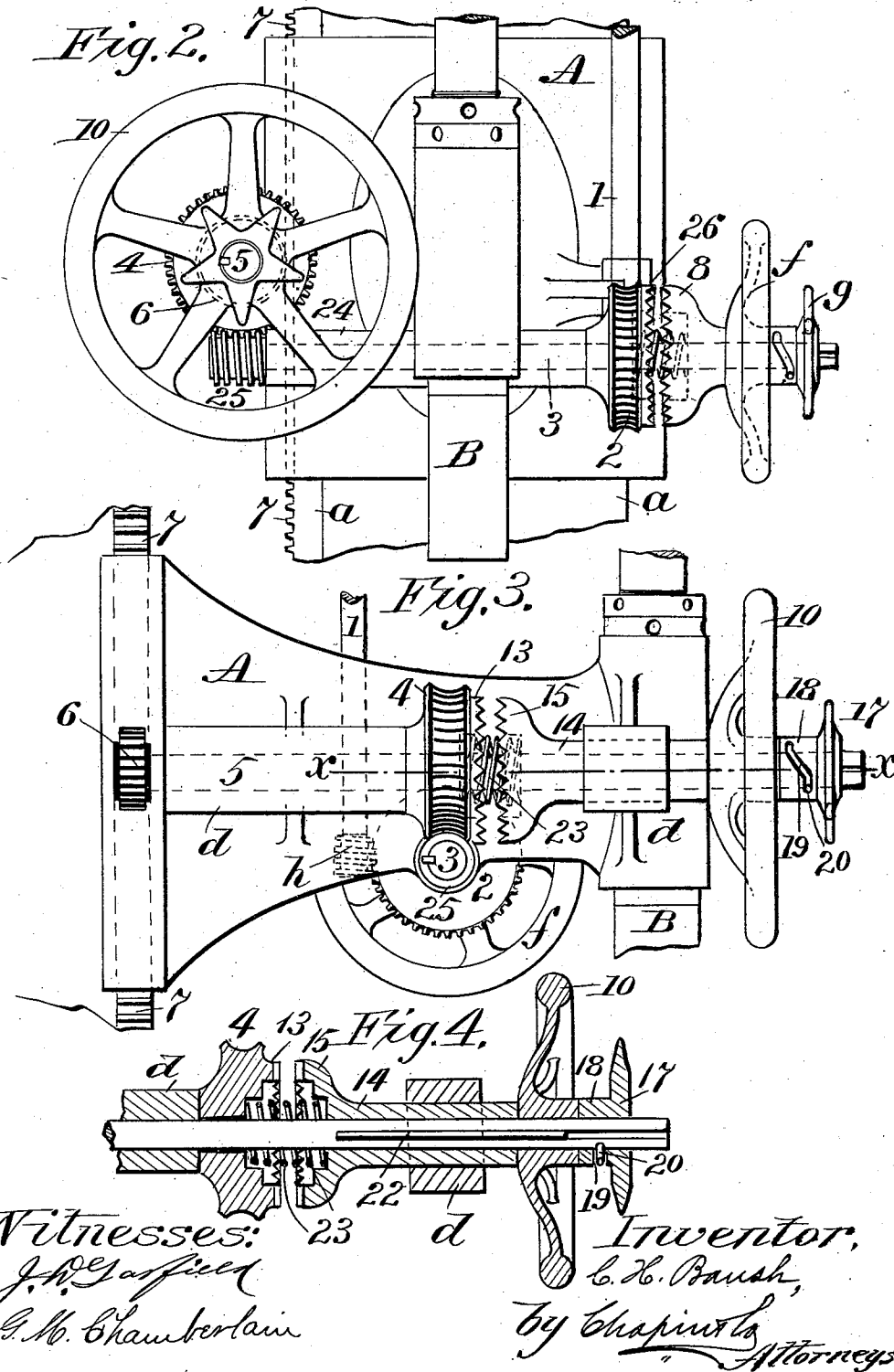
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C. H. BAUSH.

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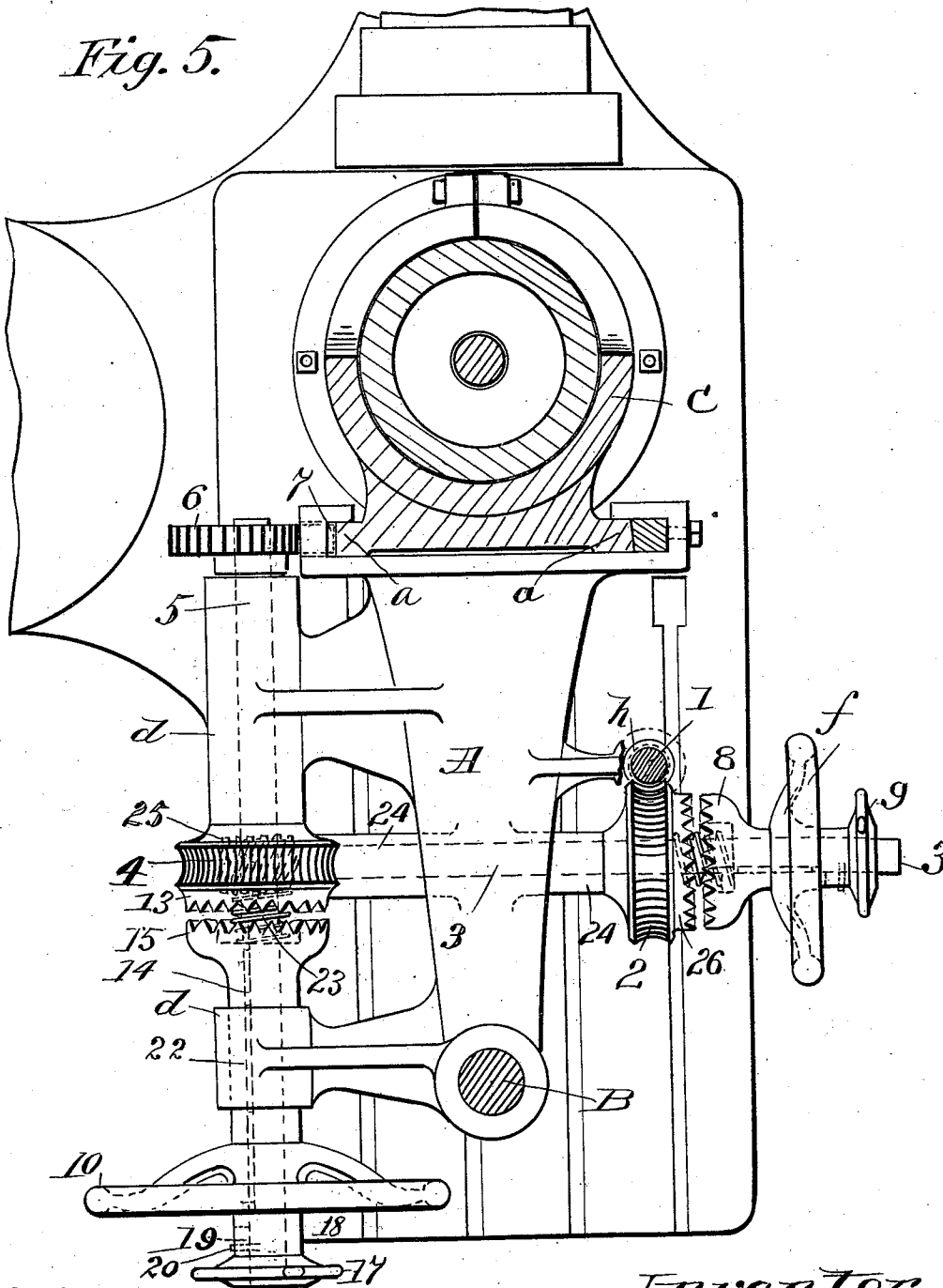


4 Sheets—Sheet 3.

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Fig. 5.



Witnesses
J. G. Garfield
J. F. Hemen.

Inventor,
C. H. Baugh
by Chapman &
Attorneys

(No Model.)

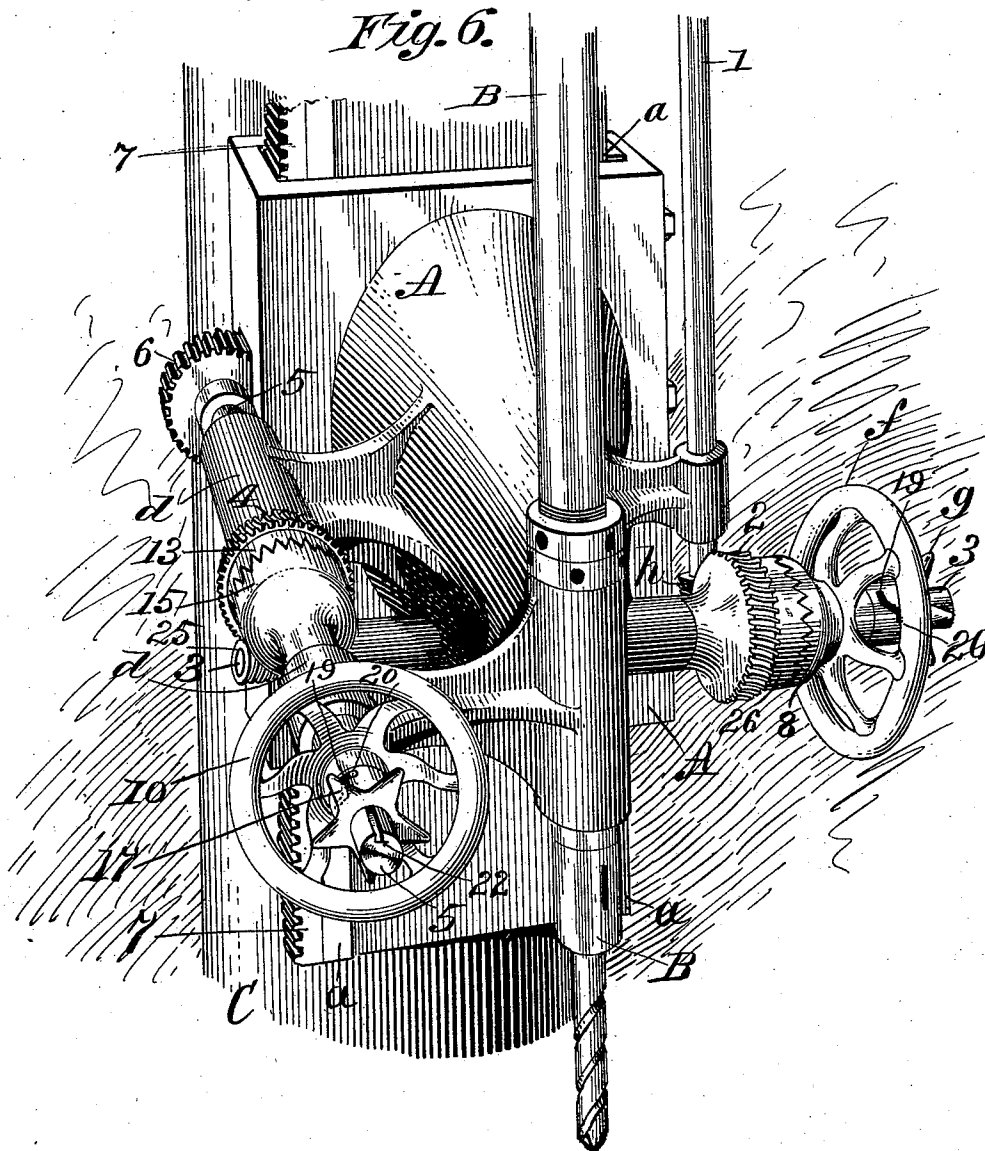
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C. H. BAUSH.

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Patented Jan. 5, 1892.



Witnesses:

J. M. Gasfield

T. F. Deneen

Inventor,

C. H. Baush
by *Chapin & Co.*
Attys—

UNITED STATES PATENT OFFICE.

CHRISTIAN H. BAUSH, OF HOLYOKE, MASSACHUSETTS.

HEAD-OPERATING MECHANISM FOR THE TOOL-SPINDLES OF DRILLING-MACHINES, &c.

SPECIFICATION forming part of Letters Patent No. 466,553, dated January 5, 1892.

Application filed April 16, 1891. Serial No. 389,236. (No model.)

To all whom it may concern:

Be it known that I, CHRISTIAN H. BAUSH, a citizen of the United States, residing at Holyoke, in the county of Hampden and State of Massachusetts, have invented new and useful Improvements in Head-Operating Mechanism for the Tool Spindles or Holders of Drilling and other Machines, of which the following is a specification.

10 This invention relates to improvements in mechanism which acts in conjunction with the movable head for carrying the drill or tool spindle or carrier of machines of the class to which drilling machinery relates for insuring the feed movement of the said movable tool-carrying part.

15 The object of the invention is to provide mechanism to act on the carrying-head for the drill-spindle or tool-holder, whereby the spindle or holder may be power driven and moved endwise, and whereby at will the power-driving of the spindle may be terminated, the spindle then, nevertheless, being free to be fed or moved endwise in either direction by hand through suitable parts of the mechanism.

20 The invention essentially embodies, for the purpose above indicated, the constructions and combinations of parts, all substantially as will hereinafter more fully appear, and be set forth in the claims.

25 In the accompanying drawings an embodiment of the present invention is shown as particularly applied to a drilling-machine, Figure 1 being a side elevation of an upright drill with an improved mechanism for acting in conjunction with the drill-spindle-carrying head. Fig. 2 is a front elevation, on a larger scale, of the said improved mechanism; and Fig. 3 is a side elevation of the same, or as seen taken at right angles to the view Fig. 2 and at the side opposite that showing the parts as in Fig. 1. Fig. 4 is a sectional view on line *xx* of Fig. 3. Fig. 5 is a plan view of the drill-spindle-carrying head and the mechanism for acting in conjunction therewith, which constitutes the present invention, the supporting-standard and certain shafts being shown in horizontal cross-section. Fig. 6 is a view clearly illustrating in perspective the relative arrangement and connection of all of the parts which pertain to the invention.

A represents the head, which supports the drill-spindle B in a usual manner, the drill-spindle being rotatable vertically in and through the head, but confined against endwise movement relative to the head, which latter, however, is movably guided on the ways *a* of the upright or standard C. The head A is suspended through the chain *b*, as usual in drills of this class, and suitable driving mechanism for securing the rotation of the drill-spindle is to be provided, such mechanism, so far as this invention is concerned, being of a usual kind and not necessary to particularly illustrate.

7 represents a rack vertically formed or fixed upon the upright C, and 5 represents a shaft horizontally mounted on suitable brackets or bearings *d* of the head A, which at its one end is provided with the pinion-gear 6, that meshes with the said rack 7.

4 represents a gear-wheel, (shown as in the form of a worm-gear,) and the same, as indicated in Fig. 4 particularly, is mounted loosely on said shaft 5 next to one of the bearings *d*. One face of the said worm gear-wheel 4 is formed serrated to constitute one member of a clutch, as at 13, and mounted adjacent thereto on the said shaft is the sleeve 14, which is capable of an endwise movement along the shaft without rotation thereon toward and away from the worm-gear-wheel 4. As shown in Fig. 4, the said sleeve is spline-engaged with the shaft 5, and its end which is toward the worm gear-wheel 4 is provided with the serrated hub 15, which constitutes the other member of the clutch for the said worm-wheel. The said sleeve 14 plays endwise through one of the hubbed brackets *d*, and there is upon the shaft 5, toward its end outside of the end of the sleeve, a hand-wheel 10, which is also spline-engaged with the said shaft. Virtually the sleeve 14 is as an extended hub of the said hand-wheel, although for practicability of construction and assemblage they are separately formed, and outside of the hand-wheel 10 there is another wheel 17, which has the extended hub 18 provided therein with the cam-slot 19, through which passes the stud 20 of the said shaft 5. The spline 22 of the shaft 5 is not extended outwardly along said shaft to have any engagement with the said wheel 17 or its hub, so that the said wheel may have a par-

tial rotation on the shaft, and of course as the said wheel 17 is turned, due to the engagement of the stud 20 and the said slotted hub, the wheel and hub move axially on the shaft, and if the movement is inward the wheel 10 and sleeve 14 are forced to clutch-engage the sleeve with the worm-wheel 4; or if the movement is the reverse, said parts—the sleeve and hand-wheel 10—will have an outward movement, due to the reaction of the spring 23, which is interposed in suitable depressions concentrically formed in the said clutch-forming parts 13 and 15, substantially as shown.

3 represents a shaft horizontally mounted in a suitable bearing-hub 24 of the head A, the same extending at right angles to the line of the said shaft 5, and the said shaft has on its one end which is in proximity to the worm-wheel 4 a worm-screw 25, which is in mesh with the said worm-wheel 4. There is on said shaft 3 toward its other end a worm gear-wheel 2, which is loose thereon and is provided on its outside with the clutch member 26, and outside thereof is mounted a hand-wheel *f* and sleeve 8, both of which are spline-connected on the shaft in substantially the same manner as hand-wheel 10 and hub 14 are mounted and spline-connected on the shaft 5, and outside of this hand wheel *f* is another wheel *g*, which has the cam-slotted hub to engage a stud on shaft 3 as the cam-slotted hub of the wheel 17 engages the stud on the other shaft 5.

1 represents the driving-shaft for the drill-spindle feed mechanism, the same being suitably mounted and receiving its rotation in a usual manner, and on the lower end thereof there is a worm-screw *h*, which gears into the worm-wheel 2. A spring is interposed, as seen in Figs. 2 and 5, between the clutch member 26 on the worm-wheel 2 and the clutch member on the spline-engaged sleeve 8, which is inside of the hand-wheel *f*, so that the said sleeve and wheel when the wheel *g* is properly turned to permit will be slid into its outward disposition.

On desiring to run the drill by power the wheel *g* is turned to force the clutch member 8 into engagement with the one 26 on the worm-wheel 2, and the wheel 17 is turned to place the clutch member 15 into engagement with the one 13 on the worm-wheel 4, when of course the power transmitted from the shaft 1 to the loose worm-wheel 2 will impart a rotary motion to the part 8 and hand-wheel *f* and due to the spline connection between them and the shaft 3 also to the shaft 3, which in turn by its worm engagement therewith secures the rotation of worm-wheel 4, that is loose on shaft 5. The wheel 4, however, imparts a rotary motion to shaft 5 through the clutch-engaged sleeve 14, which is splined on such shaft 5, when of course the pinion 6 will slowly rotate to effect by its engagement with the rack 7, consequently, a vertical movement of the head A; but on desiring to effect the vertical movement of the head by hand for

the purpose of quickly reversing the drill the clutch 8 is thrown out of engagement with the worm-wheel 2, which is loose on shaft 3, when said wheel 2 will not turn the shaft 3, said shaft being then free to be rotated entirely independent of and without in any manner being affected by the power through shaft 1 or to remain stationary. Now on turning the hand-wheel 10 the feed of the head rapidly by the rack-and-pinion engagement may be effected, and in order that at this time it will not be necessary to turn the worm-shaft 3 and the sleeve-clutch 8, wheel *f*, and wheel *g* thereon the sleeve 14, inside of the hand-wheel 10, is unclutched from the worm-wheel 4, and the shaft 5 then rotates loosely in and through the said worm-wheel 4, which at this time remains immovable. On desiring to effect the slow feed movement of the head by hand the sleeve 14 is put into clutch with worm-wheel 4, and clutch members 26 and 8 being out of engagement, as shown in Fig. 3, and at the right only of Fig. 5, the slow movement is effected by then turning the hand-wheel *f*.

I here desire to observe that I have in the following first three claims designated the parts or elements of the combinations by reference numbers or characters for the sole and particular purpose of more readily indicating which shafts and gears are therein referred to, and not with any intention of having said reference-numerals understood as limiting, for instance, the gears to which said reference-numbers are applied to any particular form of gears, for obviously bevel-gears and bevel-pinions might in practice be substituted to act in the places of the worm-screws and worm-wheels shown.

What I claim as my invention is—

1. The combination, with a tool-carrying head provided with a feed-shaft 5, of another shaft 3, mounted on the head, which has a gear engagement with said feed-shaft and is further provided with a gear-wheel, as 2, and a power driving-shaft 1 for the mechanism having a gear engagement with the said gear-wheel 2, and a clutch device operative with relation to said gear-wheel 2 and its shaft, whereby it may be connected to rotate with or rendered free on its shaft, for the purpose set forth.

2. The combination, with a tool-carrying head provided with a feed-shaft 5, which has a gear-wheel 4 thereon, of driving connections for said gear-wheel having a gear engagement therewith, and a clutch device operative in relation to said gear-wheel 4 and the said feed-shaft, whereby said gear-wheel may be connected to rotate with or rendered free on the feed-shaft, substantially as described.

3. The combination, with a carrying-head having a holder for the tool mounted thereon and provided with a feed-shaft 5, which has a gear-wheel, as 4, thereon and a clutch device operative with relation to said gear-wheel and the feed-shaft, whereby said gear-wheel

may be made rotatable with or rendered loose on the feed-shaft, of another shaft 3, having a gear engagement with said feed-shaft gear-wheel and itself provided with a gear-wheel, as 2, and a clutch device operative with relation to said shaft 3 and its gear-wheel, whereby said latter gear 2 may also be rendered rotatable with or free on its shaft, and a driving-shaft 1, having a gear engagement with said gear-wheel 2, for the purposes set forth.

4. The combination, with the feed-shaft 5 for the drill-spindle-carrying head, provided with the worm gear-wheel 4, loose on said shaft and having thereon a clutch member 13, of a sleeve 15 and hand-wheel 10, splined for a sliding movement on the feed-shaft and adapted to be clutch-engaged with the said worm gear-wheel, a shaft 3, having a worm 25 thereon engaging said gear 4, means for driving same, and devices for insuring the endwise movement of the said sleeve and hand-wheel, substantially as described.

5. The combination, with the feed-shaft for the drill-spindle-carrying head, provided with the worm gear-wheel 4, loose on the shaft and having thereon a clutch member, of a sleeve and hand-wheel splined on the shaft and adapted to be clutch-engaged with said worm gear-wheel, the spring 23 between the said gear and said sleeve, the wheel 17 on said feed-shaft having the cam-slotted hub, a stud 20 on the shaft, having an engagement in the cam-slot, a shaft worm-gearred to said worm gear-wheel, and a driving means therefor, for the purpose set forth.

6. The combination, with the feed-shaft for the drill-spindle-carrying head, of another shaft 3, gear-engaged therewith and provided

with the worm gear-wheel 2, having a clutch member thereon, said gear-wheel 2 being loose on the shaft, the driving-shaft 1, having a worm-gear engagement with the worm-wheel 2, the hand-wheel *f* and sleeve splined on the said shaft 3, said sleeve adapted to be clutch-engaged with said worm-wheel 2, the interposed spring, the wheel *g*, mounted on the said shaft 3 and provided with the slotted hub, and the stud on the shaft in engagement with said slotted hub, substantially as and for the purpose set forth.

7. The combination, with the fixed rack 7, of the drill-spindle-carrying head having the shaft 5 mounted thereon, provided with the pinion 6, the worm-wheel 4, loose and provided with the clutch member 13, the sleeve and hand-wheel 14 and 10, splined on the said shaft, the sleeve formed with the clutch member 15, the spring 23, the wheel 17, with cam-slotted hub and the engaging stud 20, the shaft 5, the shaft 3, mounted on the head at right angles to the shaft 5, having the worm 25 and also having loosely mounted thereon the worm-wheel 2, having clutch member 26, the hand-wheel *f*, clutch-provided sleeve 8, spline engaged with the shaft and the spring between worm-wheel 2 and the sleeve, the wheel *g*, with the cam-slotted hub, the stud on the shaft 3, engaging the said slotted hub, and the driving-shaft 1, having the worm *h*, all substantially as described and shown, for the purposes set forth.

CHRISTIAN H. BAUSH.

Witnesses:

WM. S. BELLOWES,
G. M. CHAMBERLAIN.