H. DRESES.

FEEDING MECHANISM FOR METAL WORKING MACHINERY.

APPLICATION FILED NOV. 8, 1915.

1,181,580.

Patented May 2, 1916.

2 SHEETS—SHEET 1.

Fig. 1

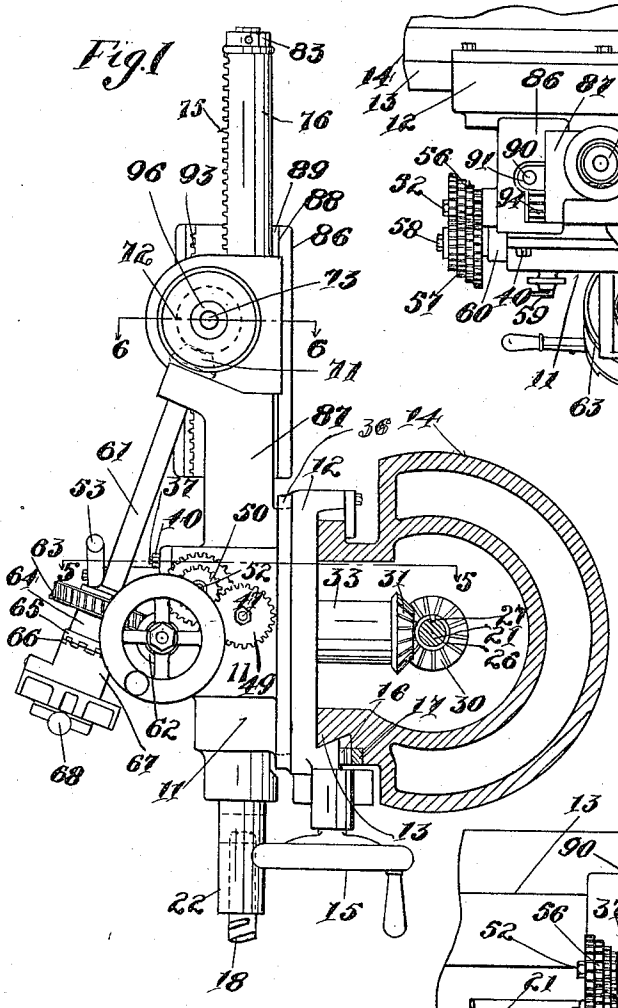


Fig. 3

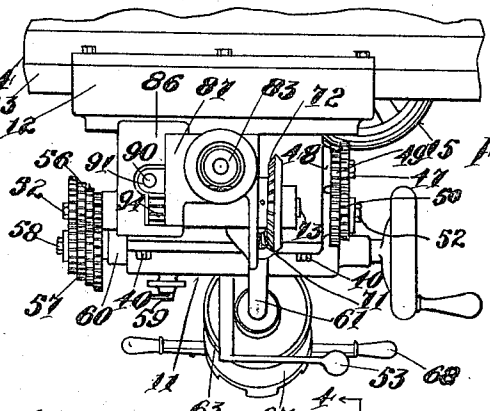
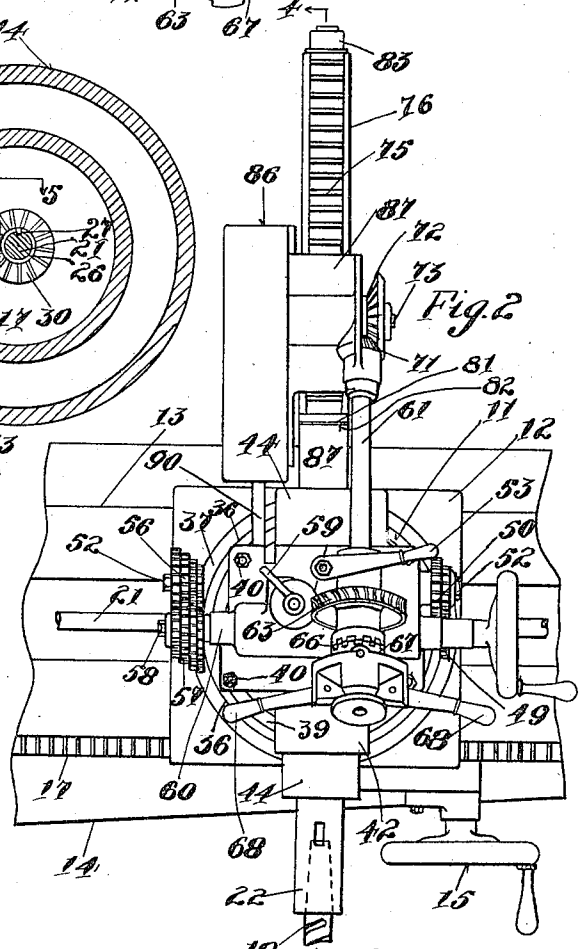


Fig. 2



Witnesses

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Fig. 4

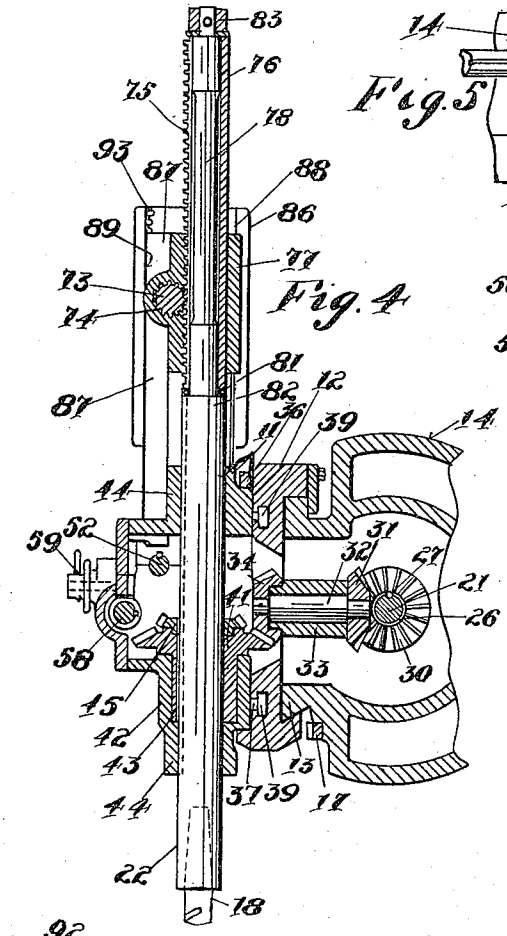


Fig. 5

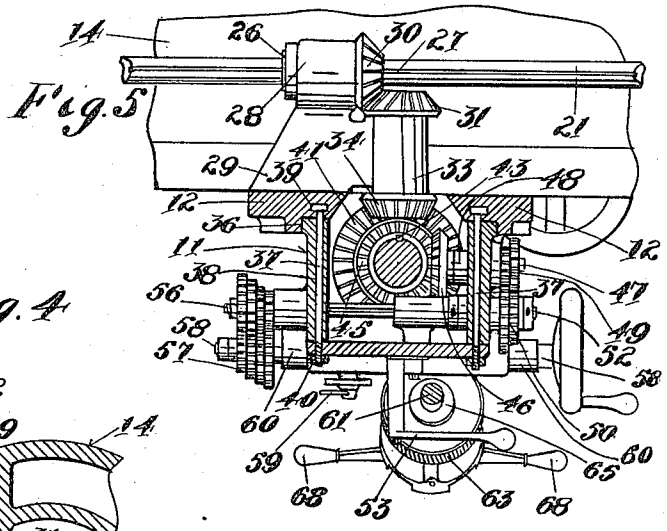


Fig. 6.

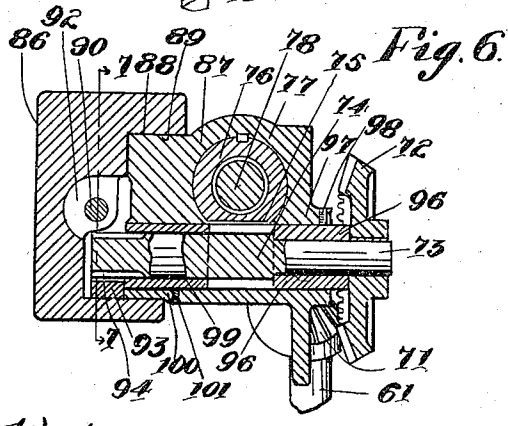
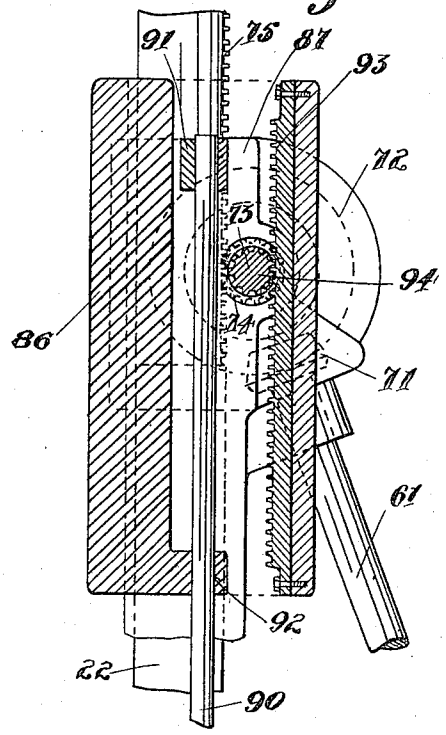


Fig. 7



Witnesses

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FEEDING MECHANISM FOR METAL-WORKING MACHINERY.

1,181,580. Specification of Letters Patent. Patented May 2, 1916.

Original application filed July 2, 1915, Serial No. 37,760. Divided and this application filed November 8, 1915. Serial No. 60,295.

To all whom it may concern:

Be it known that I, HENRY DRESES, 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 Feeding Mechanism in Metal-Working Machinery, of which the following is a specification.

My invention relates to feeding mechanism for feeding the tool and for counterweighting the tool-spindle, in metal working machinery, such as drilling machinery and other machinery employing an axially feeding, drilling, tapping, boring or similar tool.

It is the object of my invention to provide novel means for counterbalancing the tool-spindle which are compact in structure and comparatively short in movement of the moving parts, and further to provide novel means of the character mentioned, so arranged as to be a self-contained structure with the tool feeding mechanism.

This application is a division of my application for patent on improvements in feeding mechanism in metal working machinery, filed July 2, 1915, Serial No. 37,760. I do not herein claim the train of mechanism for feeding the drill-spindle, having claimed the same in my aforesaid application.

The invention will be further readily understood from the following description and claims, and from the drawings, in which latter:—

Figure 1 is a side elevation of my improved device shown mounted on the drill-arm of a metal drilling machine, the drill-arm being shown in cross-section. Fig. 2 is a front elevation of the same. Fig. 3 is a plan view of the same. Fig. 4 is a vertical section of the same taken on the line 4—4 of Fig. 2. Fig. 5 is a horizontal section of the same, taken on the line 5—5 of Fig. 1. Fig. 6 is a detail in horizontal section taken on the line 6—6 of Fig. 1; and, Fig. 7 is a detail in vertical section taken on a line corresponding to the line 7—7 of Fig. 6.

I have exemplified my invention as employed in a so-called metal drilling machine.

In the present exemplification of my invention 11 represents a suitable drill-head, shown mounted on a slide 12, arranged to slide laterally on guideways 13 of a suitable drill-arm 14, which may be the radial arm of a metal drilling machine. The slide is shown laterally adjustable on the arm by means of a hand-wheel 15 which rotates a suitable pinion 16 meshing with a rack 17 extending lengthwise of the drill-arm, for positioning the tool, as the drill 18, with relation to the material.

21 represents the drive-shaft, which in the present exemplification is arranged to provide driving force for rotating and also for feeding the drill-spindle 22, at the lower end of which the drill 18 is secured. The shaft 21 is arranged to be driven in suitable or usual manner for having different speeds imparted thereto by power, depending on the character of operations it is desired to perform.

A hub 26 has spline-connection 27 with the drive-shaft and is arranged to be moved lengthwise along the drive-shaft by being journaled in a bearing 28 of a bracket 29 extending from the slide 12. This hub has a bevel-gear 30 thereon, which meshes with a bevel-gear 31 on a shaft 32 journaled in a bearing 33 on the slide and having a second bevel-gear 34 secured thereto.

The drill-head is arranged to be adjusted about the axis of rotation of the shaft 32 for placing the drill-spindle in upright position or at an angle with relation to the work. The drill-head is guided in this adjustment by an annular guideway 36 on the slide and is arranged to be clamped in adjusted positions, as by clamp-bolts 37, extending through holes 38 in the drill-head, the heads of the bolts being received in an annular T-slot 39 in the slide, nuts 40 clamping the parts together.

The bevel-gear 34 meshes with a bevel-gear 41, the hub of which is journaled in a bearing 42 of the drill-head, and has spline-connection 43 with the drill-spindle for rotating the drill-spindle in its bearings 44 of the drill-head.

A second bevel-gear 45 is secured to and rotates with the bevel-gear 41 and meshes with a bevel-gear 46 fast on a shaft 47 journaled in a bearing 48 of the drill-head and at its other end carrying spur-gears 49 of different diameters fast thereon, forming a nest of gears.

The gears 49 mesh respectively with gears

50 of a coacting nest of gears arranged to be selectively secured to a shaft 52, as by means of a suitable key operated by a suitable handle 53 in well-understood manner.

Gears 56, forming a nest of gears of different diameters, are fixed on the shaft 52, the respective gears of which mesh with the gears of a nest of gears 57 of different diameters normally loose on a shaft 58 but arranged to be selectively fixed to said shaft, as by a suitable key operated by a handle 59 in well-understood manner. The shaft 58 is journaled in bearings 60 of the drill-head.

The speed of feed of the spindle is determined by the drive connection between the shafts 47 and 52 through the respective gears of the nests of gears 49, 50, and by the drive connection between the shafts 52 and 58 through the respective gears of the nest of gears 56, 57, in the present instance imparting eight different speeds to the drill-spindle.

A feed shaft 61 is provided.

A worm 62 is fast on the shaft 58 and meshes with a worm-wheel 63 journaled in a bearing 64 of the drill-head and prevented from endwise movement therein as by an annular flange 65 at one end of the bearing and the worm-wheel proper at the other end of the bearing.

The feed-shaft is rotatable within the worm-wheel when it is desired to impart a rotation by hand to the feed-shaft for raising or lowering the drill-spindle, and the worm-wheel is arranged to be fixed to the feed-shaft during the power-feeding movement of the drill-spindle, this selective attachment or detachment of the worm-wheel with the feed-shaft being accomplished by means of a clutch 66, the teeth of which are respectively fast with the worm-wheel and with a hub 67.

The hub 67 is slidable lengthwise of the feed-shaft and has connection with the feed-shaft so as to rotate therewith. It is provided with suitable handles 68 for causing engagement and disengagement of the clutch 66. When the clutch is disengaged, the feed-shaft is arranged to be turned by the hub 67 and handle 68. When the clutch 66 is engaged, the feed-shaft is arranged to be turned by the worm-wheel.

The construction, mounting and manner of connecting and operating the worm-wheel, clutch, hub and handles are more fully shown and described in my aforesaid application of which the present application is a division.

The connection between the feed-shaft and the spindle in the present exemplification is accomplished by providing the feed-shaft with a bevel-pinion 71 which meshes with the bevel-gear 72 on a shaft 73. This shaft is provided with a pinion 74 which meshes with a rack 75 on a rack-sleeve 76 slidable lengthwise in a bearing 77 in the drill-head, the drill-spindle having a reduced end 78 extending through said sleeve, the said sleeve and drill-spindle having combined axial movements. There is preferably a ball-bearing 81 between the lower end of the sleeve and the annular shoulder 82 on the drill-spindle, the upper end of the drill-spindle being provided with an end-bearing 83 for the upper end of the sleeve.

I have in my improved device provided novel means for counterbalancing the drill-spindle by means in which a counter-weight is provided which has a comparatively short range of movement and is self-contained with the drill-head. Thus 86 is a counter-weight which has movement lengthwise of the upward extension 87 of the drill-head. The counter-weight is provided with a guideway 88 coacting with a guide 89 on said upward extension. A rod 90 is secured in a lug 91 of said upward extension and slides in a bearing 92 on said counter-weight. The counter-weight is also provided with a rack 93 with which a pinion 94 on the shaft 73 meshes. This construction forms operating and guiding means for the counter-weight.

The pinion 74 which meshes with the rack 75 for axial feed of the tool-spindle and the pinion 94 which meshes with the rack 93 on the counter-weight are both fast on the same shaft, the rack of the drill-spindle and the rack of the counter-weight engaging said pinions respectively at opposite sides of said shaft, so that the weight of the counter-weight acting downwardly upon one side of the pinion 94 forces the opposite side of the pinion 74 upwardly for balancing the weight of the drill-spindle.

It will be further noticed that the pinion 74 is larger than the pinion 94. A given axial movement of the drill-spindle will therefore result in a less distance of movement of the counterweight, so that the distance through which the counterweight moves is comparatively short, thereby necessitating only a correspondingly short range of space for permitting this movement and resulting in economy of space in the structure and providing a self-contained counterbalancing structure for the drill-spindle.

The shaft 73 has the pinions 74, 94, formed thereon. The bevel-gear 72 is fast on the shaft 73. A bushing 96 is fast in a bearing 97 of the drill-head, as by being fixed therein by a set-screw 98. The bushing 96 is located between the bevel-gear 72 and the pinion 74. A bushing 99 is received about the shaft 73 between the pinion 74 and the rack 93 and is fast in a bearing 100 of the drill-head, as by being fixed therein by a set-screw 101. The shaft 73 rotates in the bushings 96, 99, and is held in place thereby.

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

1. In feeding mechanism of the character described, the combination of an axially feedable tool-spindle, a feed-rack therefor, a counterweight for said tool-spindle, a rack therefor, a shaft, a feed train of gearing for rotating said shaft, and gearing on said shaft meshing at opposite sides of said shaft with said respective racks.

2. In feeding mechanism of the character described, the combination of an axially feedable tool-spindle, a feed-rack therefor, a counterweight for said tool-spindle, a rack therefor, a shaft, gears of different diameters thereon, the gear of larger diameter meshing with said feed-rack and the gear of smaller diameter meshing with said second-named rack, said gears meshing with said racks at opposite sides of said shaft, and a feed train of gearing for rotating said shaft.

3. In feeding mechanism of the character described, the combination of a spindle-housing, an axially feedable tool-spindle axially movable in said spindle-housing, a counterweight for said tool-spindle, a slide-guide between said spindle-housing and counterweight, a feed-rack for said tool-spindle, a rack for said counterweight, said racks being parallel with each other, a shaft, and gearing on said shaft meshing with said respective racks at opposite sides of said shaft.

4. In feeding mechanism of the character described, the combination of a spindle-housing, an axially feedable tool-spindle axially movable in said spindle-housing, a counterweight for said tool-spindle, a slide-guide between said spindle-housing and counterweight, a feed-rack for said tool-spindle, a rack for said counterweight, said racks being parallel with each other, a shaft, gearing on said shaft meshing with said respective racks at opposite sides of said shaft, means for adjusting said spindle-housing about an axis whereby said tool-spindle, slide-guide, counterweight and racks are placed in angular relation to the vertical while their relative positions are retained.

5. In feeding mechanism of the character described, the combination of a spindle-housing having an upward extension, a tool-spindle having axial feeding movement in said upward extension, a feed-rack for said tool-spindle, a counterweight for said tool-spindle, said counterweight having slide-guide connection with said upward extension, a rack on said counterweight, a cross-shaft, said cross-shaft having gears of different diameters fast thereon, the gear of larger diameter being in mesh with said feed-rack and the gear of smaller diameter being in mesh with the other of said racks, said gears meshing with said racks respectively at opposite sides of said shaft, and means for rotating said shaft.

6. In feeding mechanism of the character described, the combination of a spindle-housing having an upward extension, a tool-spindle having axial feeding movement in said upward extension, a feed-rack for said tool-spindle, a counterweight for said tool-spindle, a guide-rod between said housing and counterweight, said housing and counterweight constituting a plurality of parts, one of said parts comprising a bearing and the other of said parts having said guide-rod secured thereto for movement in said bearing, a rack on said counterweight, a cross-shaft, said cross-shaft having gears of different diameters fast thereon, the gear of larger diameter being in mesh with said feed-rack and the gear of smaller diameter being in mesh with the other of said racks, said gears meshing with said racks respectively at opposite sides of said shaft, and means for rotating said shaft.

In testimony whereof, I have hereunto signed my name in the presence of two subscribing witnesses.

HENRY DRESES.

Witnesses:
CHARLES E. WEBER,
THERESA M. SILBER.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."