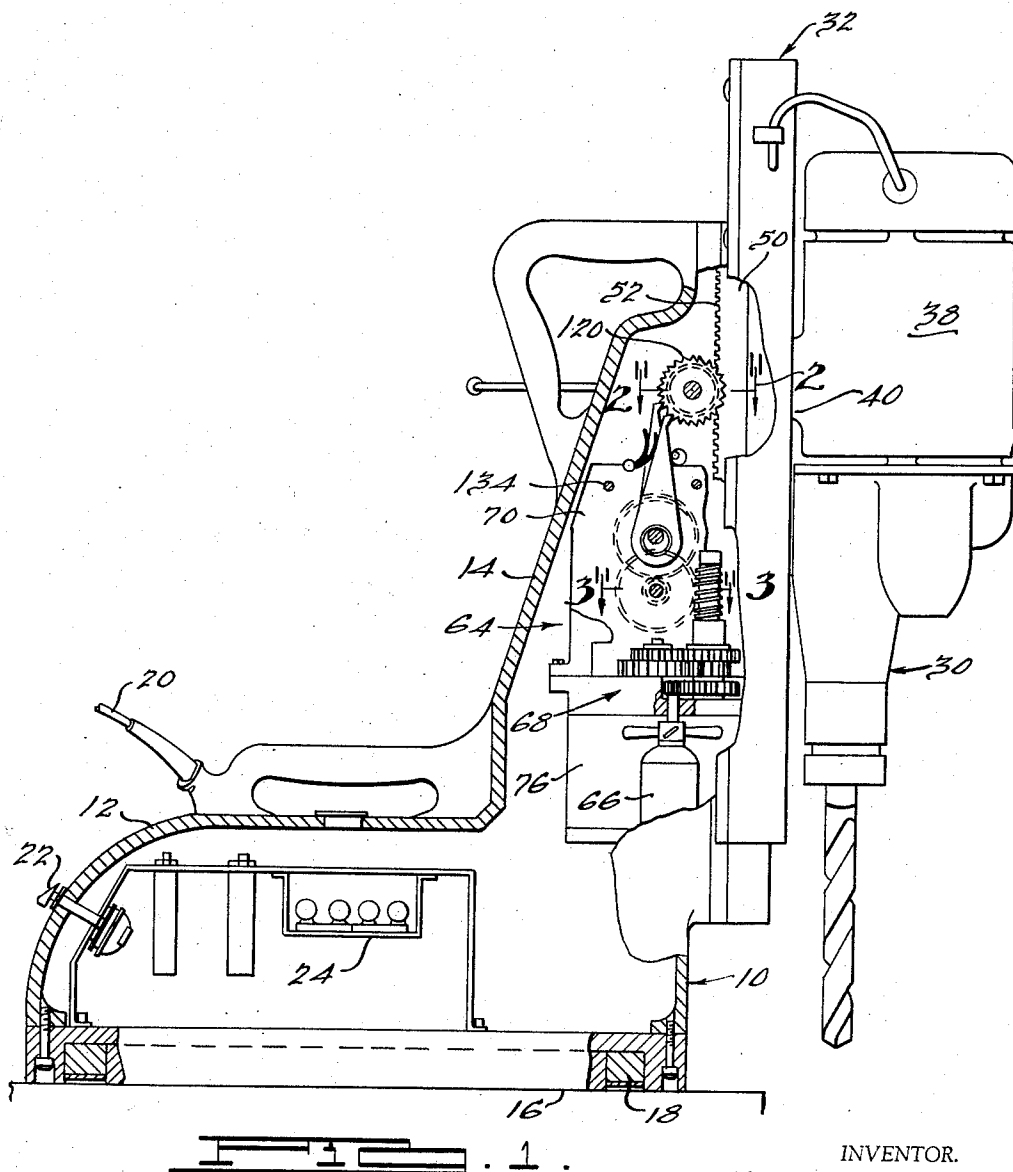


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2,887,911

2 Sheets-Sheet 1



INVENTOR.

Arthur R. Bunting.

BY *Balluff & W. K. Kinsley*

ATTORNEYS

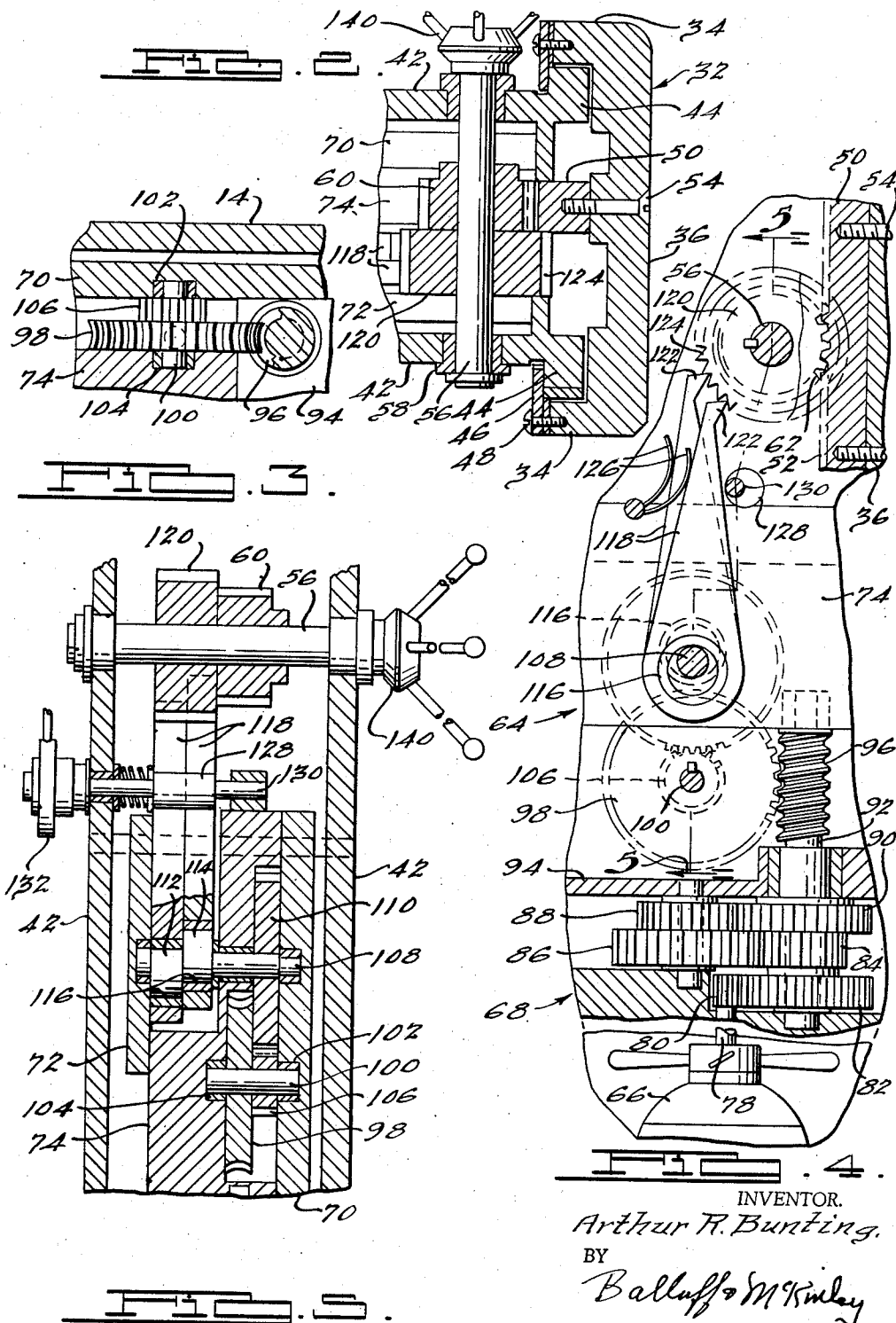
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A. R. BUNTING
AUTOMATIC TOOL FEED

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2 Sheets-Sheet 2



INVENTOR.
Arthur R. Bunting.
BY
Balluff & McKimley
ATTORNEYS.

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AUTOMATIC TOOL FEED

Arthur R. Bunting, Clarkston, Mich., assignor to Lupear Products, Incorporated, Farmington, Mich., a corporation of Michigan

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6 Claims. (Cl. 77—33.4)

This invention relates to a portable machine tool unit and has particular reference to a portable magnetic drill provided with power-operated means for feeding the drill into the work.

According to the present invention, a portable magnetic supporting base adapted to be magnetically secured onto a surface is provided with means for movably supporting a tool unit such as an electric drill for movement toward and away from the work. The invention is more specifically directed to a power-driven feed means for feeding the drill into the work and includes a very compact and efficient speed reduction transmission, having a driven part operable for feeding the tool unit toward and away from the work.

A principal object of the invention is to provide a new and improved portable tool unit.

A further object of the invention is to provide a portable magnetic base tool unit having power driven feed mechanism for feeding the tool into the work.

Another object of the invention is to provide a power driven feed mechanism for a tool unit of the type described which is compact and adapted to be inserted as a unit into the supporting casting of the portable tool unit.

Other and further objects of the invention will be apparent from the following description and claims and may be understood by reference to the accompanying drawings, of which there are two sheets, which by way of illustration show a preferred embodiment of the invention and what I now consider to be the best mode in which I have contemplated applying the principles of my invention. Other embodiments of the invention may be used without departing from the scope of the present invention as set forth in the appended claims.

In the drawings:

Fig. 1 is a side elevational view with parts broken away, illustrating the portable tool unit of the present invention;

Fig. 2 is a sectional view taken on line 2—2 of Fig. 1;

Fig. 3 is a sectional view taken on line 3—3 of Fig. 1;

Fig. 4 is an enlarged elevational view partly in section, illustrating the feed mechanism; and

Fig. 5 is a sectional view taken on line 5—5 of Fig. 4.

The portable tool unit illustrated in the drawings may comprise a housing 10 in the form of a hollow casting having a generally horizontal body portion 12 and a vertically extending column 14. The housing 10 is provided with a magnetic base 16 at its lower end which may be suitably secured thereto and includes a coil 18 adapted to be energized for magnetizing the base 16 when the unit is properly located on a supporting surface or on the work to be machined. The coil 18 may be energized from a suitable electric source, including a cord 20 and a switch mechanism 22 and a rheostat 24 connected into the circuit for energizing the coil 18 to a desired degree. The details of construction and operation of the magnetic base form no part of the present invention.

2

An electric drill 30 or other machine tool is secured on a slide 32 which, as illustrated in Fig. 2, is generally channel shaped and includes vertically extending side walls 34 and a connecting wall 36. The electric drill 30 includes a motor 38 for rotating the drill and is secured to the wall 36 of the slide 32 by suitable screws passing through the wall 36 and threaded into a mounting pad 40 formed on the casing of the drill unit.

The column casting 14 includes spaced apart side walls 42 having vertical guide flanges 44 interfitted with the slide 32 to guide the latter and the tool unit supported thereon for sliding movement toward and away from the surface on which the device is supported. Plates 46 are secured to the side walls 34 of the slide 32 by screws 48, and the plates slidably engage the guide flanges 44 on the column casting 14.

A rack 50 having teeth 52 is secured by screws 54 to the base of the slide 32. A shaft 56 is journaled by bearings 58 in the opposing side walls 42 of the column casting 14. A drive pinion 60 is keyed onto shaft 56 and the teeth 62 of the drive pinion 60 are meshed with the teeth 52 on the rack 50 so that when the pinion is rotated the rack 50 and the slide 32 and drill 30 carried thereby will be fed toward or away from the work to be machined.

The drive mechanism for the pinion 60 is supported within the column casting 14 and includes a housing unit 64 for supporting a small electric motor 66 and a speed reduction transmission 68 providing a driving connection between the electric motor 66 and the drive pinion 60. The housing unit 64 includes a pair of side plates 70 and 72 and a bearing block 74 confined therebetween and a lower housing portion 76 adapted to support the motor 66.

The motor shaft 78 is provided with a pinion 80 meshed with a gear 82 forming a part of a double gear, the other gear 84 of which is meshed with the larger gear 86 of a second double gear, the other gear 88 of which is meshed with a gear 90 secured on a worm shaft 92 which projects upwardly from a bearing portion 94 of the bearing block 74 and is provided with a worm 96 meshed with a worm wheel 98 keyed onto a shaft 100 supported at its opposite ends in suitable bearings 102 and 104 in plate 70 and bearing block 74 respectively. A pinion gear 106 is also keyed onto shaft 100.

A crankshaft 108 has its ends journaled in bearings provided in plates 70 and 72 and a gear 110 is secured on crankshaft 108 and is driven from pinion 106. The crankshaft 108 is provided with crank portions 112 and 114 having bearings 116 and a reciprocable pawl 118 is journaled on each crank portion 112 or 114 by the bearings 116. When the crankshaft 108 is driven through the speed reduction transmission described, the pawls 118 will oscillate or reciprocate in a generally vertical direction. A ratchet 120 is secured on shaft 56 for rotating the shaft and the drive pinion 60 secured thereon. As illustrated in Fig. 4, the upper ends 122 of the pawls 118 are adapted to engage the teeth 124 formed on ratchet 120 in such manner that the pawls 118 will alternately impart rotatable movement to the ratchet and the drive pinion 60 which is rotatable therewith. The arrangement of the pawls 118 on the crankshaft 108 is such that, as one of the pawls moves upwardly, it engages one of the ratchet teeth to rotate the ratchet and the drive pinion, while the other of the pawls 118 is at such time being lowered into a position where it can engage a succeeding ratchet tooth during continued rotation of the crankshaft. The pawls 118 thus alternately engage and disengage the ratchet teeth 124 to drive the shaft 56 and pinion 60 which drives the rack 50 and the drill unit secured thereto. A pair of leaf springs 126 react against the pawls 118 to urge the latter into engagement with the ratchet teeth. The pawls may be disengaged from the

ratchet teeth by an eccentric cam member 128 formed on a manually rotatable shaft 130 journaled in one of the side walls 42 of the casting 14 and having a knob or handle 132 for turning the shaft 130 and the eccentric cam 128 which is adapted to swing the pawls 118 against springs 126 to retract the pawls from the ratchet teeth.

The supporting plates 70 and 72 and the bearing block 74 may be supported within the column casting 14 in any suitable manner such as by bolts 134.

When the tool unit is to be placed in use, the tool must first be properly located on the work to be machined, or on an adjacent supporting surface, and the magnetic coil is energized to magnetize the base and hold the unit in position during the machining operation. The drill motor 38 may then be energized and the cam device 128 may be rotated to permit engagement of the pawls 118 with the ratchet 120. The motor 66 is then started and through the speed reduction transmission and the pawl and ratchet mechanism drives the pinion 60 and rack 50 in a direction to feed the drill 30 into the work. After the drilling or other machining operation is completed, the motor 66 is turned off and the cam 128 rotated to withdraw the pawls 118 from the ratchet 120. The drill motor 138 may then be stopped and shaft 56, which carries drive pinion 60, may be turned by means of a manually operable knob 140 in a direction to rotate the pinion in a counterclockwise direction as viewed in Figs. 1 and 4 to slide the rack 50 and the drill unit carried thereby upwardly to withdraw the drill from the work.

It will be apparent that suitable control means may be employed to obtain the desired operation of drill motor 38 and the feed motor 66 and that the tool feed mechanism disclosed herein may be useful in some applications other than in conjunction with magnetic base tool units as described.

While I have illustrated and described a preferred embodiment of my invention, it is understood that this is capable of modification, and I therefore do not wish to be limited to the precise details set forth but desire to avail myself of such changes and alterations as fall within the purview of the following claims.

I claim:

1. In a portable tool unit, a supporting base, a power-driven tool slidably mounted on said base for movement toward and away from the work, feed means for said tool comprising an electric motor, a crankshaft, speed reduction gearing for driving said crankshaft from said motor, a pinion and a rack meshed with said pinion and slidably supported on said base, said tool being secured to said rack, a ratchet wheel rotatable with said pinion, a pair of pawls journaled on said crankshaft for reciprocation thereby, said pawls alternately engaging said ratchet for rotating the same and said pinion in a direction to feed the tool toward the work upon operation of said motor, spring means urging said pawls into engagement with said ratchet, a cam operable for moving said pawls out of engagement with said ratchet, and manually operable means for rotating said pinion in the opposite direction to withdraw said tool from the work.

2. In a portable tool unit, a supporting base, an electric motor, a crankshaft, speed reduction gearing for driving said crankshaft from said motor, a drive pinion, a rack meshed with said pinion and slidably supported on said base, a power-driven tool secured to said rack, a ratchet rotatable with said pinion, a pair of pawls journaled on said crankshaft for reciprocation thereby, said pawls alternately engaging said ratchet for rotating the same and said pinion in a direction to feed the rack and the tool carried thereby toward the work upon operation of said motor, means urging said pawls into engagement with said ratchet, manually operable means for moving said pawls out of engagement with said ratchet to permit

rotation of said pinion in the opposite direction to withdraw said tool from the work.

3. In a portable drill unit having a magnetic supporting base and a column on which a power drill is slidably mounted for movement toward and away from the work, feed means for said drill comprising an electric motor, a crankshaft journaled in said column, speed reduction gearing for driving said crankshaft from said motor, a pinion journaled in said column, a rack meshed with said pinion and slidably supported on said column, said drill being secured to said rack, a ratchet rotatable with said pinion, a pair of pawls journaled on said crankshaft for reciprocation thereby, said pawls alternately engaging said ratchet for rotating the same and said pinion in a direction to feed the drill toward the work upon operation of said motor.

4. In a portable tool unit having a supporting housing and a power-driven tool slidably mounted thereon for movement toward and away from the work, a rotatable drive member journaled in said housing and drivingly connected to said tool, an electric motor in said housing, a drive transmitting connection between said motor and drive member for rotating the latter to feed the tool toward the work upon operation of said motor, said drive transmitting connection including a ratchet and a pair of motor-driven pawls alternately engageable therewith, spring means urging said pawls into engagement with said ratchet, manually operable cam means for moving said pawls out of engagement with said ratchet to break said drive transmitting connection, and manually operable means for rotating said drive member independently of said motor.

5. In a portable drill unit having a supporting housing, a rack slidably supported on said housing, a power-driven machine tool adapted to be secured on said rack for movement therewith toward and away from the work, feed means for said tool comprising an electric motor in said housing, a crankshaft journaled in said housing, speed reduction gearing for driving said crankshaft from said motor, a pinion journaled in said housing and meshed with said rack, a ratchet rotatable with said pinion, a pair of pawls journaled on said crankshaft for reciprocation thereby, said pawls alternately engaging said ratchet for rotating the same and said pinion in a direction to feed the rack and tool carried thereby toward the work upon operation of said motor, means for moving said pawls out of engagement with said ratchet, and manually operable means for rotating said pinion in the opposite direction to withdraw the tool from the work.

6. In a portable drill unit, a supporting base and a column rising therefrom, a power drill slidably mounted on said column for movement toward and away from the work, feed means for said power drill comprising an electric motor, a rotatable drive member journaled in said column and drivingly connected to said drill for feeding the latter toward and away from the work, speed reduction gearing between said drive member and said motor, said speed reduction gearing including a ratchet rotatable with said drive member and a pair of pawls driven from said motor and alternately engaging said ratchet for rotating the same and said drive member in a direction to feed the drill toward the work upon operation of said motor, and manually operable means for moving said pawls out of engagement with said ratchet to permit manual rotation of said drive member.

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