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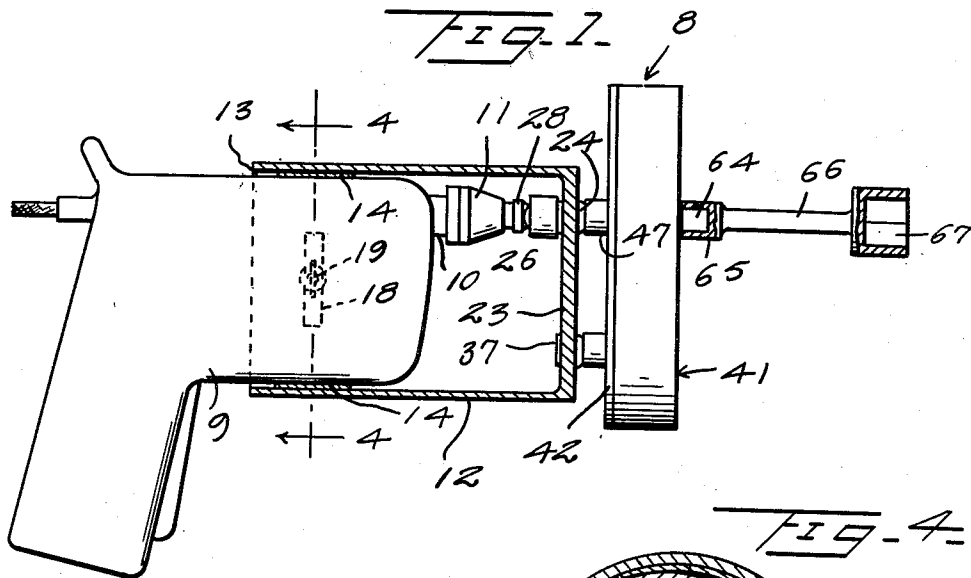
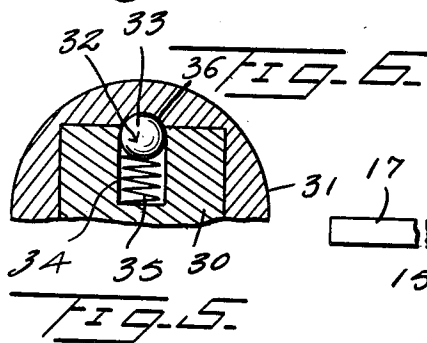
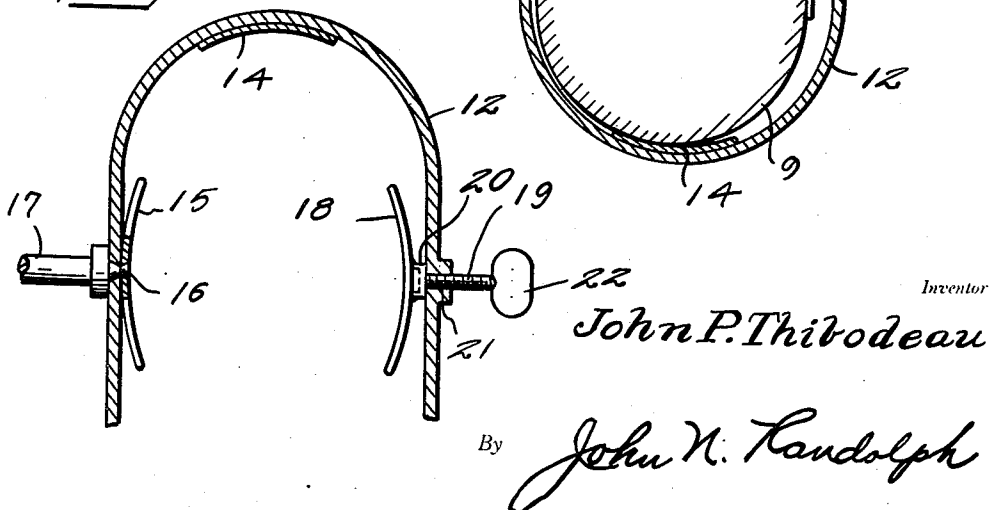
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2,552,234

DRILL ADAPTER FOR POWERING TURNING TOOLS

Filed March 18, 1949

2 Sheets-Sheet 1



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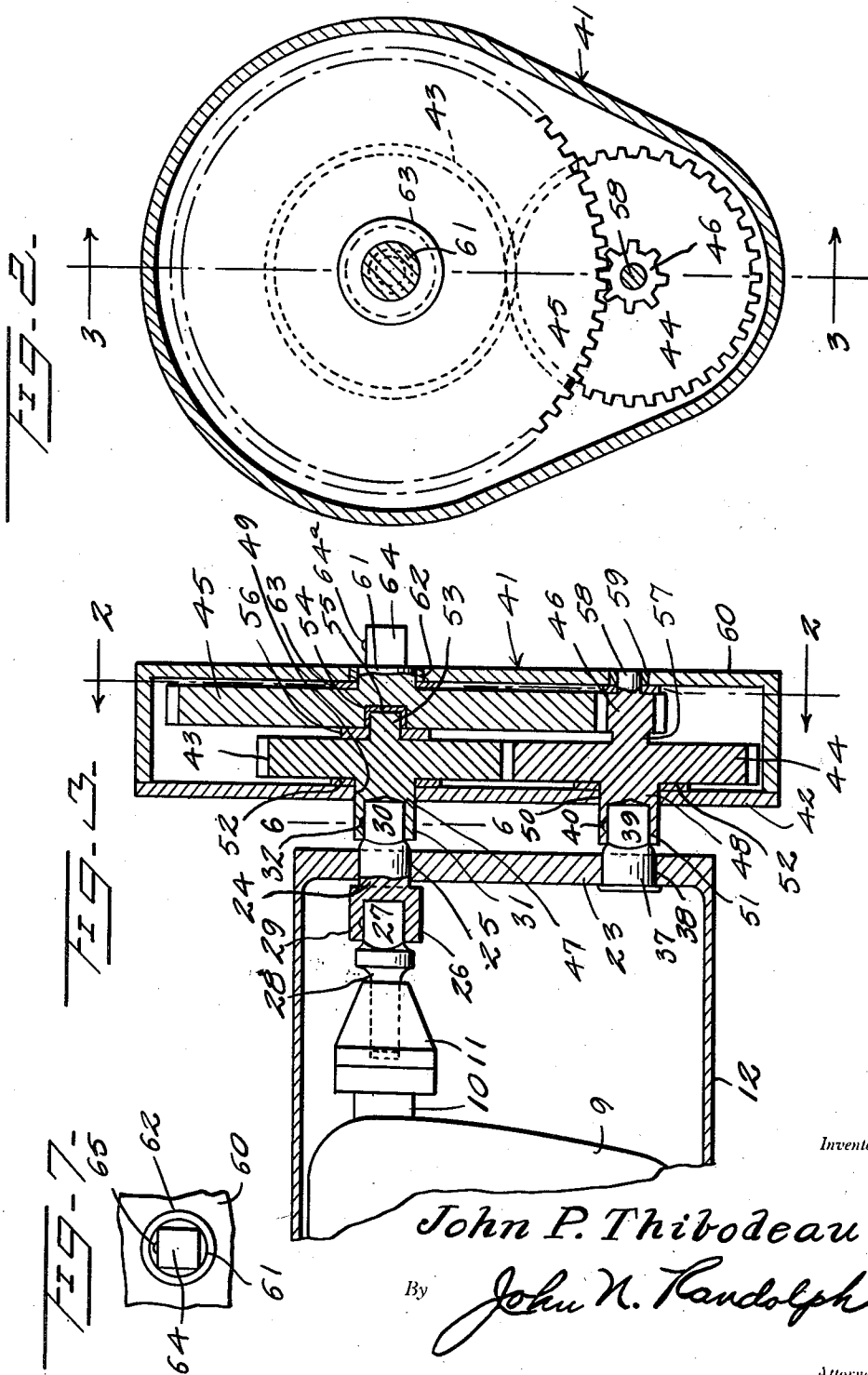
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DRILL ADAPTER FOR POWERING TURNING TOOLS

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DRILL ADAPTER FOR POWERING TURNING TOOLS

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6 Claims. (Cl. 74—421)

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This invention relates to an adapter unit for rotatably driving turning tools such as socket wrenches, screw drivers, drills or the like and which is adapted to be detachably applied to and driven by a conventional electric drill.

More particularly, it is a primary object of the present invention to provide an adapter for the aforescribed purpose which may be utilized for driving a turning tool in either direction from the driven shaft of an electric drill which is driven in only one direction.

A further object of the invention is to provide a drill adapter having reduction gearing for causing a driven shaft thereof which is adapted to be connected to a turning tool to be driven at a reduced speed and in either the same direction or opposite direction to the drive shaft of an electric drill and by means of which the reduction gearing is powered.

Still a further object of the invention is to provide an adapter unit of extremely simple construction capable of being economically manufactured and sold and which may be readily applied to or removed from a conventional electric drill for use in conjunction therewith as a portable power source for substantially all types of turning tools or tool shanks.

Various other objects and advantages of the invention will hereinafter become more fully apparent from the following description of the drawings, illustrating a presently preferred embodiment thereof, and wherein:

Figure 1 is a side elevational view, partly in vertical section showing the adapter unit applied to a convention electric drill for driving a socket wrench;

Figure 2 is an enlarged cross sectional view through the gear housing of the adapter unit taken substantially along a plane as indicated by the line 2—2 of Figure 3;

Figure 3 is a longitudinal sectional view of the adapter unit taken substantially along a plane as indicated by the line 3—3 of Figure 2 and with a portion of the drill being illustrated in side elevation;

Figure 4 is a cross sectional view of a portion of the adapter unit, on an enlarged scale, taken substantially along a plane as indicated by the line 4—4 of Figure 1;

Figure 5 is a fragmentary sectional view similar to Figure 4, with the drill casing omitted;

Figure 6 is an enlarged fragmentary cross sectional view taken substantially along a plane as indicated by the line 6—6 of Figure 3, and

Figure 7 is a fragmentary end elevational view

looking toward a portion of the outer side of the gear housing and showing the driven shaft thereof in end elevation.

Referring more specifically to the drawings, for the purpose of illustrating a preferred application and use of the drill adapter unit, designated generally 8 and comprising the invention, a conventional portable type electric drill is illustrated in the drawings at 9, the casing of which is provided with a conventional pistol grip-type handle. The driven shaft 10 which projects from one end of the drill casing is provided with a conventional chuck 11.

The drill adapter unit 8 includes a relatively large socket shaped supporting member 12 having an open end 13 which is adapted to receive a portion of the casing or housing of the drill 9, including the end thereof from which the drill shaft 10 projects. The supporting member 12 is illustrated in Figures 4 and 5 as being oval shaped in cross section to conform generally to the cross sectional shape of the forward end of the drill casing but it will be readily apparent that the size and cross sectional shape of the supporting member 12 could vary to adapt the unit 8 to electric drills having casings of different shapes and sizes. Strips of cushioning material 14 are secured to the inner sides of the upper and lower portions of the supporting member 12 to cushion the casing of the drill 9 therein and said supporting member 12 is shown provided at one side thereof with a yieldable, outwardly bowed clamping strip 15 which is disposed internally of the member 12 and supported by a fastening 16 which additionally functions to mount a handle 17 which projects laterally from the supporting member 12. A similar clamping element 18 is disposed adjacent the opposite side of the supporting member 12 and in opposed relationship to the clamping element 15 and is provided on its outer, convex side with an outwardly projecting screw 19 which is rotatably connected thereto by a swivel joint 20 and which engages a threaded opening 21 in a side of the supporting member 12. The screw 19 is provided with a wing-shaped head 22 at its outer end by means of which said screw may be turned for advancing the clamping element 18 inwardly of the supporting member 12 to cause the side portions of the drill casing to be detachably clamped between the resilient clamping elements 15 and 18 which yield into substantially parallel relationship when in clamping position, as illustrated in Figure 4. Obviously, if desired, the handle 17 could be omitted and the clamping element 15 could be provided with

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a feed screw 19 corresponding to said feed screw of the clamping element 18 or the handle 17 could be mounted on the outer end of the feed screw in lieu of the head 22.

An end wall 23, constituting the closed end of the supporting member 12, has a short shaft 24 journaled in an opening 25 thereof. The shaft 24 is provided with a non-circular socket 26 at its inner end adapted to receive a similarly shaped end 27 of a stub shaft 28 which has an opposite, restricted end which is detachably secured in the chuck 11. The shank end 27 is provided with a releasable snap connection 29, corresponding to the snap connection as illustrated in detail in Figure 6 and which will hereinafter be described. The opposite end of the shaft 24, which projects outwardly from the wall 23, is likewise of non-circular cross section and forms a shank 30 which is adapted to fit a similarly shaped socket 31 and which is releasably retained in engagement therewith by a snap connection 32, as best illustrated in Figure 6 and which includes a ball or spherical member 33 which is reciprocally disposed in lateral recess 34 of the shank 30 and which is urged outwardly thereof by an expansion spring 35 to releasably engage a concave recess 36 in one wall of the socket 31. The outer end of the recess 34 is preferably beveled to retain the ball or sphere 32 therein.

An idler shaft 37 is journaled in an opening 38 of the end wall 23 and has an outwardly projecting shank end 39, corresponding to the shank 30 and provided with a snap connection 40, corresponding to the snap connections 29 and 32.

A gear housing 41 having a removable side wall 42 is shaped to accommodate the gears 43, 44 and 45 and a pinion 46. The gears 43 and 44 which are of the same diameter and provided with the same number of teeth are provided with laterally projecting hubs or bosses 47 and 48, respectively, which project from corresponding sides thereof through openings 49 and 50 of the side wall 42, in which said hubs are journaled. The outer end of the hub 47 is recessed to provide the socket 31 and the outer end of the hub 48 is similarly recessed to provide a socket 51 to receive the idler shank 39 when the shank 30 is in engagement with the socket 31. The hubs 47 and 48 preferably carry anti-friction washers 52 which are located between the gears 43 and 44 and the wall 42. The gear 43 is provided with a restricted boss or extension 53 which projects laterally from the opposite side thereof and which is axially aligned with the boss 47. The extension or boss 53 is journaled in a centrally disposed socket 54 which opens laterally outward of the inner side of the gear 45 and which is preferably lined with an anti-friction material 55. An anti-friction washer 56 is disposed on the boss 53 between the gears 43 and 45. The gears 43 and 44 are disposed for meshing engagement at all times when positioned in the housing 41 and the gear 44 is provided with the pinion 46 which is integrally connected thereto by a hub portion 57 which projects laterally therefrom in the opposite direction to its hub 48. A stub shaft 58 extends from the outer side of the pinion 46 and is journaled in an opening 59 of the opposite side wall 60 of the housing 41 and which is likewise preferably provided with an anti-friction bushing or lining. The gear 45 has an integral hub 61 projecting from its outer side and which is journaled in an opening 62 of the housing wall 60, which opening is likewise pro-

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vided with an anti-friction bushing. An anti-friction washer 63 is carried by the hub 61 and disposed between the wall 60 and gear 45. The hub 61 is provided with an outer shank end of non-circular cross section, designated 64, corresponding to the shank 27 and which is likewise provided with a snap connection 64a, like the snap connection 32, illustrated in Figure 6. As seen in Figure 1, the shank 64 is adapted to detachably engage and fit snugly in the non-circular socket 65 formed on one end of a tool shank 66 which is shown as provided with a wrench socket 67, of conventional construction, at its opposite end. However, it will be readily apparent that the tool shank 66 could be provided with a screw driver blade, drill bit or other rotary type tool head at its opposite end.

Assuming that the adapter unit 8 is applied as illustrated in Figure 1, to the electric drill 9 and with the tool shank 66 attached to the driven member 64 of the gearing, the drill shaft 10 will be revolved in one direction by the electric motor, not shown, of the drill 9 to turn the gear 43 in the same direction through the connection made therewith by the parts 24 and 28 and which will cause the gear 44 and pinion 46 to be revolved by the gear 43 in the opposite direction and with the idler stub-shaft 37 turning with said gear 44 and functioning to retain the gear housing 41 against rotation relatively to the supporting member 12. This will cause the gear 45 to be driven by the pinion 46 in the opposite direction to the gear 44 and to said pinion but in the same direction as the gear 43 but at a greatly reduced speed due to the difference in the size and number of teeth of the pinion 46 as compared to the gear 45. It will thus be readily apparent that the driven hub or shaft 61 of the adapter unit 8 will be turned at a greatly reduced speed relatively to the speed of rotation of the drill shaft 10 and accordingly with greater power so that it will effectively function for applying torque to the tool shank 66 and with sufficient power so that the wrench socket 67 can be employed for turning nuts or bolts or other elements which it is capable of engaging. Assuming that the drill adapter 8 when applied as illustrated in Figure 1, will drive the tool shank 66 in a direction for applying elements having a right-hand thread or clockwise, looking from left to right of Figure 1, when it is desired to turn the drill shank 66 in the opposite direction for removing fastenings, not shown, engaged by the wrench socket 67, it is only necessary to disengage the sockets 31 and 51 from the shanks 30 and 39 and to turn the gear housing 41 through an arc of 180° so that the socket 51 can be engaged with the shank 30 and the socket 31 with the shank 39. The gear 41 will then be driven directly by the drill shaft 10 and accordingly in the opposite direction to which it is driven when the unit is assembled, as seen in Figures 1 and 3, and accordingly the gear 45 will be turned in the opposite direction to thereby cause the tool shank 66 to be turned in the opposite direction to the drill shaft 10 and likewise at the same reduced speed relatively thereto.

It will thus be readily apparent that an adapter unit of extremely simple construction has been provided whereby various types of turning tools may be driven at a reduced speed and in either direction by an electric drill which is capable of rotating a shaft in only one direction. It will likewise be readily apparent that the tool can

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be quickly applied to or removed from an electric drill and that the gear housing of the adapter unit can be quickly and easily disengaged and reversed to reverse the direction in which the gear thereof will be driven. It will also be readily apparent that no adjustment of the gears or clutch means is required to effect this reversal of direction of movement of the gears and parts connected thereto. It will be readily apparent that the adapter unit 8 when applied to the electric drill 9 constitutes a portable power tool which is adapted to be manually supported by the user grasping the pistol-grip handle of the drill 9 with one hand and the handle 17 with the other hand for steadying the tool in use.

Various modifications and changes are contemplated and may obviously be resorted to, without departing from the spirit or scope of the invention as hereinafter defined by the appended claims.

I claim as my invention:

1. An adapter unit for use with a portable electric drill, comprising a supporting member, means to detachably mount the supporting member on an end of an electric drill, said supporting member having a closed end, a shaft journaled in said closed end and extending therethrough, means detachably connecting the inner end of said shaft to the drive shaft of the drill for rotation therewith; a gear housing having an inner side wall and an outer side wall, a first gear, a second gear and a third gear disposed for rotation in said gear housing, said first and second gears being disposed in meshing engagement and having hub portions projecting laterally from corresponding sides thereof and journaled in the inner side wall of the gear housing, the hub portion of said first gear being detachably connected to the outer end of the adapter unit shaft for causing the first gear to revolve with the drill shaft, a pinion of smaller diameter than the gears fixed to the opposite side of the second gear having a stub shaft journaled in the outer side wall of the gear housing, said pinion meshing with said third gear to cause the third gear to be revolved in the same direction as the first gear but at a reduced speed, said third gear having a hub portion and stub shaft projecting from its outer side and extending through and journaled in said outer side wall, said stub shaft of the third gear being adapted to detachably engage and rotate a turning tool to cause the turning tool to be revolved by the electric drill in the same direction as the drill shaft but at a reduced speed, the hub portion of said second gear being provided with an outwardly opening socket for selectively engaging the outer end of the adapter unit shaft to cause the gears and pinion of the gear housing to be driven in the opposite direction for revolving the turning tool in the opposite direction to the drill shaft.

2. An adapter unit for use with a portable electric drill, comprising a supporting member, means to detachably mount the supporting member on an end of an electric drill, said supporting member having a closed end, a shaft journaled in said closed end and extending therethrough, means detachably connecting the inner end of said shaft to the drive shaft of the drill for rotation therewith; a gear housing having an inner side wall and an outer side wall, a first gear, a second gear and a third gear disposed for rotation in said gear housing, said first and second gears being disposed in meshing engagement and having hub portions projecting later-

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ally from corresponding sides thereof and journaled in the inner side wall of the gear housing, the hub portion of said first gear being detachably connected to the outer end of the adapter unit shaft for causing the first gear to revolve with the drill shaft, a pinion of smaller diameter than the gears fixed to the opposite side of the second gear having a stub shaft journaled in the outer side wall of the gear housing, said pinion meshing with said third gear to cause the third gear to be revolved in the same direction as the first gear but at a reduced speed, said third gear having a hub portion and stub shaft projecting from its outer side and extending through and journaled in said outer side wall, said stub shaft of the third gear being adapted to detachably engage and rotate a turning tool to cause the turning tool to be revolved by the electric drill in the same direction as the drill shaft but at a reduced speed, the hub portion of said second gear being provided with an outwardly opening socket for selectively engaging the outer end of the adapter unit shaft to cause the gears and pinion of the gear housing to be driven in the opposite direction for revolving the turning tool in the opposite direction to the drill shaft, and an idler shaft journaled in the closed end of said supporting member and projecting outwardly therefrom for releasably engaging one of the first or second gear hub sockets and for rotation therewith to releasably retain the gear housing against rotation relatively to said supporting member when the gears thereof are revolved.

3. An adapter unit for use with a portable electric drill, comprising a supporting member, means to detachably mount the supporting member on an end of an electric drill, said supporting member having a closed end, a shaft journaled in said closed end and extending there-through, means detachably connecting the inner end of said shaft to the drive shaft of the drill for rotation therewith; a gear housing having an inner side wall and an outer side wall, a first gear, a second gear and a third gear disposed for rotation in said gear housing, said first and second gears being disposed in meshing engagement and having hub portions projecting laterally from corresponding sides thereof and journaled in the inner side wall of the gear housing, the hub portion of said first gear being detachably connected to the outer end of the adapter unit shaft for causing the first gear to revolve with the drill shaft, a pinion of smaller diameter than the gears fixed to the opposite side of the second gear having a stub shaft journaled in the outer side wall of the gear housing, said pinion meshing with said third gear to cause the third gear to be revolved in the same direction as the first gear but at a reduced speed, said third gear having a hub portion and stub shaft projecting from its outer side and extending through and journaled in said outer side wall, said stub shaft of the third gear being adapted to detachably engage and rotate a turning tool to cause the turning tool to be revolved by the electric drill in the same direction as the drill shaft but at a reduced speed, said adapter unit shaft having an outer end of non-circular cross section, the hub portions of said first and second gears having outwardly opening non-circular sockets for selectively and detachably engaging the outer end of the adapter unit shaft for causing either of the first or second gears to be driven directly by the drill shaft for revolving the third gear in either direction at a reduced speed.

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4. An adapter unit for use with a portable electric drill, comprising a supporting member, means to detachably mount the supporting member on an end of an electric drill, said supporting member having a closed end, a shaft journaled in said closed end and extending there-through, means detachably connecting the inner end of said shaft to the drive shaft of the drill for rotation therewith; a gear housing having an inner side wall and an outer side wall, a first gear, a second gear and a third gear disposed for rotation in said gear housing, said first and second gears being disposed in meshing engagement and having hub portions projecting laterally from corresponding sides thereof and journaled in the inner side wall of the gear housing, the hub portion of said first gear being detachably connected to the outer end of the adapter unit shaft for causing the first gear to revolve with the drill shaft, a pinion of smaller diameter than the gears fixed to the opposite side of the second gear having a stub shaft journaled in the outer side wall of the gear housing, said pinion meshing with said third gear to cause the third gear to be revolved in the same direction as the first gear but at a reduced speed, said third gear having a hub portion and stub shaft projecting from its outer side and extending through and journaled in said outer side wall, said stub shaft of the third gear being adapted to detachably engage and rotate a turning tool to cause the turning tool to be revolved by the electric drill in the same direction as the drill shaft but at a reduced speed, said first and third gears being disposed in axial alignment, said first gear having a restricted hub portion projecting from its inner side, said third gear having a centrally disposed inwardly opening journal for said restricted hub portion for connecting said gears for rotation relatively to one another in the same direction but at different speeds.

5. An adapter unit for powering turning tools for use with a portable electric drill, comprising a gear housing, a first gear, a second gear and a third gear disposed for rotation in said gear hous-

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ing, said first and second gears being disposed for meshing engagement and each having a hub portion projecting laterally therefrom and extending through and journaled in one side wall of the gear housing, either of said hub portions being adapted to be detachably coupled to the drive shaft of an electric drill for causing the gear thereof to be revolved in unison with the drill shaft, a pinion fixed to and disposed in axial alignment with the second gear and meshing with said third gear for revolving the third gear at a reduced speed relatively to the first and second gears, and a stub shaft fixed to and projecting laterally from the outer side of the central portion of said third gear and extending through and journaled in the opposite side wall of the gear housing and adapted to be detachably connected to a turning tool whereby said turning tool will be driven by the drill shaft at a reduced speed and in either direction relatively thereto.

6. An adapter unit as in claim 5, an idler stub shaft for engaging the other hub socket to releasably hold the gear housing from rotation relatively to the electric drill when the gears thereof are revolved, and means detachably supported by the electric drill for journaling said idler stub shaft.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,372,045	Sedgewick	Mar. 22, 1921
1,964,855	Moore	July 3, 1934
2,302,853	Gordon	Nov. 24, 1942
2,428,049	Tate	Sept. 30, 1947

FOREIGN PATENTS

Number	Country	Date
316,836	Germany	Dec. 5, 1919