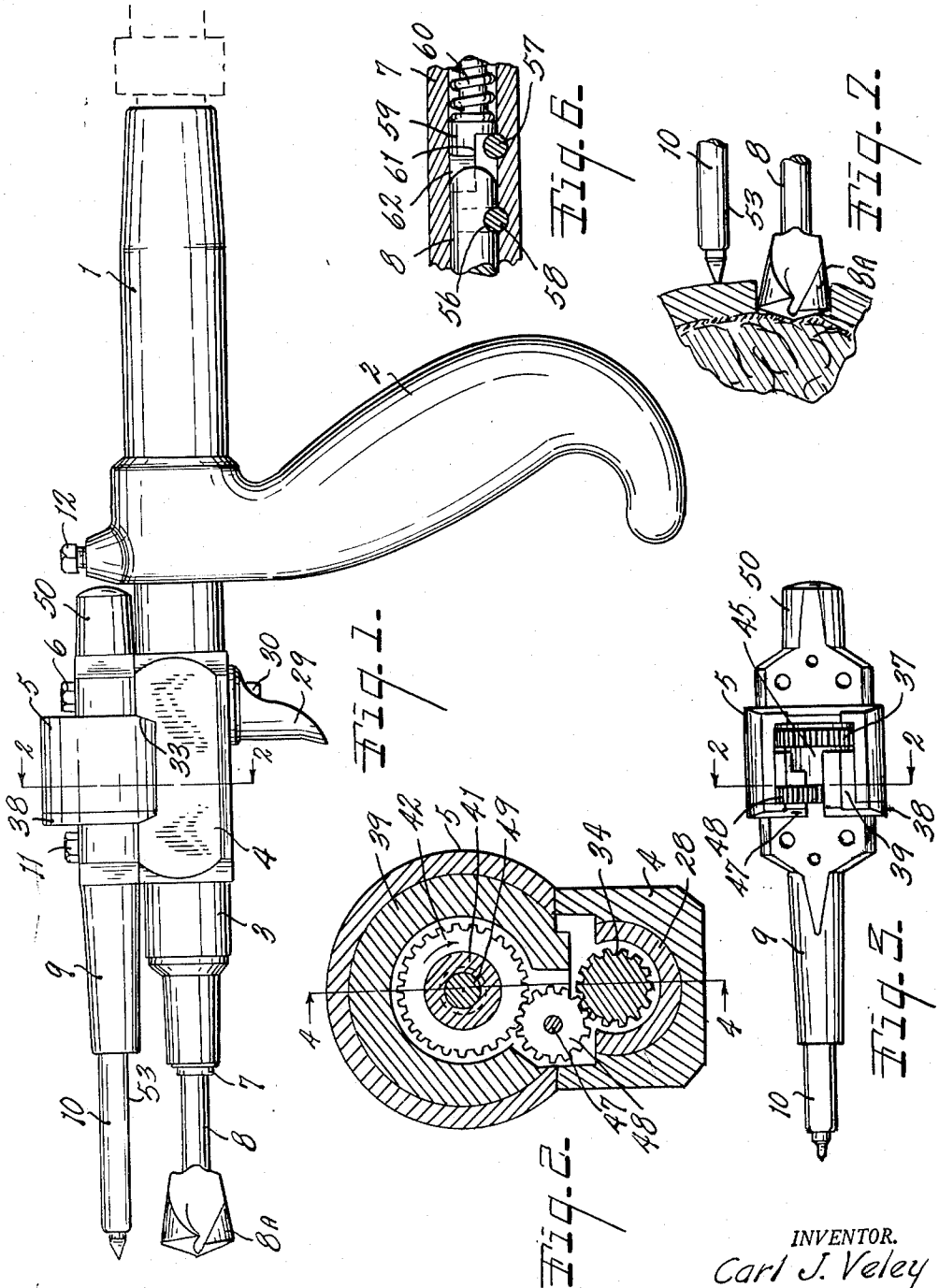
April 13, 1954 C. J. VELEY 2,675,003

SURGICAL DRILL

Filed Jan. 2, 1953 2 Sheets-Sheet 1



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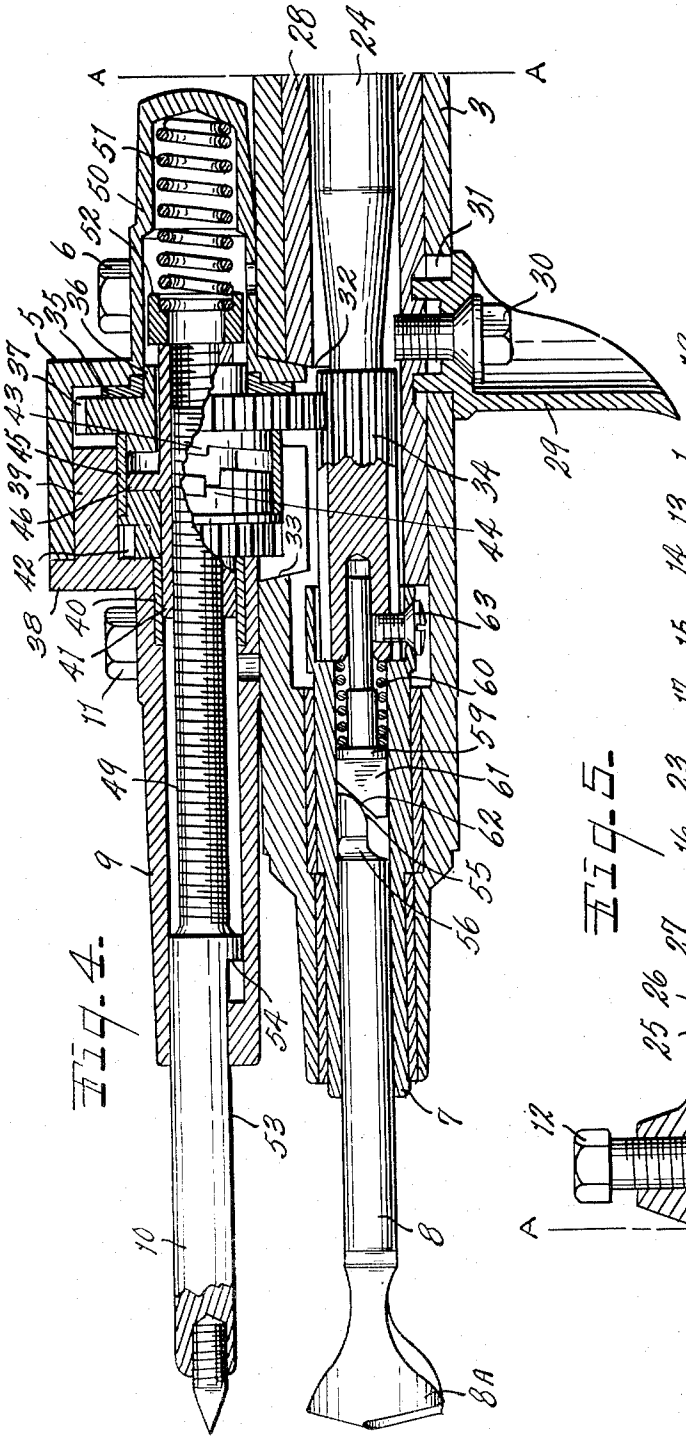

FIG. 4.

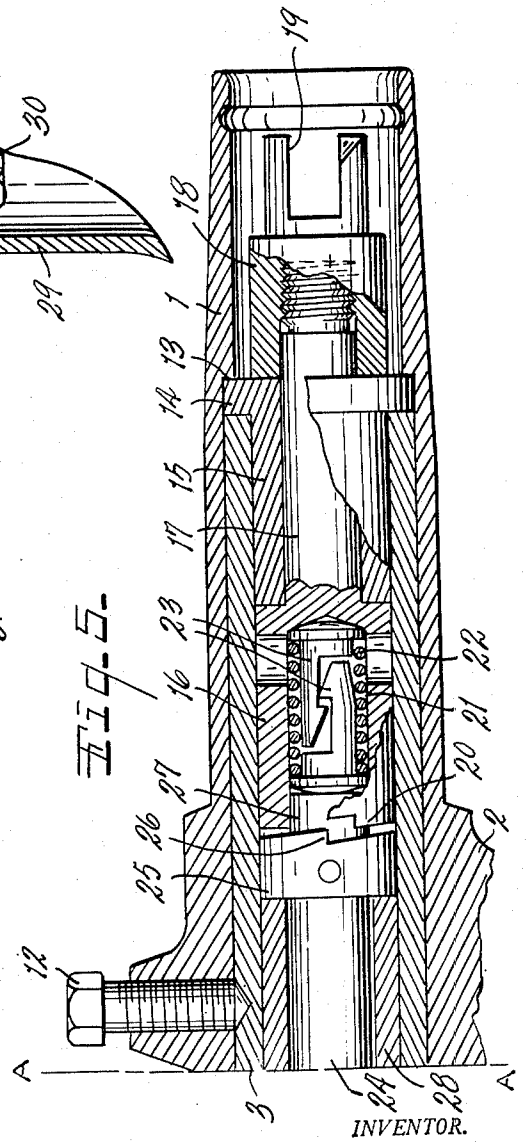

FIG. 5.

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Patented Apr. 13, 1954 2,675,003

UNITED STATES PATENT OFFICE

2,675,003

SURGICAL DRILL

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Application January 2, 1953, Serial No. 329,164

10 Claims. (Cl. 128—310)

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This invention relates to improvements in surgical drill.

The principal objects of this invention are:

First, to provide a surgical drill for drilling through bone in which the drill will stop automatically after having passed through the bone.

Second, to provide a surgical drill of the automatic stopping type with a tool rest that retracts automatically into the body of the tool as the drill bit advances into the work.

Third, to provide a surgical drill with a reciprocable tool rest that can be advanced by manual manipulation of the tool and which will retract automatically into the body of the tool as the tool bit advances in the work.

Fourth, to provide a surgical drill tool with a moveable tool rest that is driven from the bit on the tool so as to adjust itself with respect to the body of the tool as the bit operates.

Fifth, to provide a surgical drill tool having a tool rest that is driven from the tool bit and provided with automatic disengaging means in the driving connection between the bit and the rest to prevent the rest from being ejected from the tool and to prevent jamming of the driving mechanism at both extremes of movement of the rest.

Sixth, to provide a surgical drill tool which is extremely compact and easy to handle and which is easy and safe to use in delicate operations involving bone surgery.

Other objects and advantages of my invention will appear from a consideration of the following description and claims:

The drawing of which there are two sheets illustrate a highly practical embodiment of the drill.

Fig. 1 is a side elevation view of the drill.

Fig. 2 is a transverse cross sectional view through the drill and taken along the plane of the line 2—2 in Figs. 1 and 3.

Fig. 3 is a bottom plan view of the tool rest and tool rest housing shown in Figs. 1 and 2 after the housing has been removed from the remainder of the tool.

Fig. 4 is a fragmentary vertical longitudinal cross-sectional view through the drill and including the tool rest and housing and taken along the plane of the line 4—4 in Fig. 2.

Fig. 5 is a fragmentary vertical cross sectional view through the body of the drill and taken along the plane of the line 4—4 in Fig. 2, Fig. 5 being a longitudinal continuation of Fig. 4 from the line A—A.

Fig. 6 is an enlarged fragmentary cross sectional view through the tool bit holding tube of the drill and illustrating the releasable bit holding lock of the drill.

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Fig. 7 is a fragmentary elevational view of the tool rest end bit in operative relation to a portion of a head, the head being shown in cross section.

As is most clearly illustrated in Fig. 1 the drill comprises generally a tubular body 1 having a handle or grip 2 projecting therefrom. The body is hollow as will be described and at its forward end receives and supports a cylindrical tubular barrel 3 which projects forwardly from the grip. The intermediate portion of the barrel 3 is of enlarged rectangular cross section as indicated at 4 and provides a support for a housing 5 secured to the top of the rectangular portion by cap screws 6. The forward end of the barrel 3 rotatably receives a bit handling tube 7 which receives and holds the shank 8 of a tool bit 8A. The forward end of the housing 5 is closed by the tool rest guide 9 that projects forwardly along the top of the barrel 3. The tool rest guide receives and supports the reciprocating tool rest 10 as will be more particularly described. The tool rest guide is secured to the enlarged portion 4 of the barrel by cap screws 11; a cap screw 12 releasably connecting the body 1 to the barrel 3.

Considering in greater detail the structure for rotating the bit 9 and the bit holding tube 7, attention is directed to Figs. 4 and 5. The rear end of the tubular body 1 is provided with a forwardly facing internal shoulder 13 against which the flange 14 of a bearing 15 is seated. The rear end of the barrel 3 presses against the flange 14 to hold the bearing in place. A connector shaft 16 is rotatably disposed toward the rear end of the barrel 3 and is provided with a rear portion of reduced diameter 17 journaled in and extending through the bearing 15. A nut 18 threaded on the rear end of the connector shaft locks the shaft axially in the bearing and is provided with a slotted end 19 adapted to be drivingly connected to a flexible shaft inserted into the rear end of the body. The forward end of the connector shaft 16 is formed into a spiral clutch face having a jaw portion 20 and the forward end of the connector shaft is axially bored as at 21 to receive a preloaded compressible spring 22. The spring 22 is preloaded and restrained against expansion by interlocking plugs 23 inserted into its ends.

Extended forwardly from the connector shaft 16 is a drive shaft 24 having an enlarged flange or collar 25 on its rear end. The rear end of

the flange 25 is formed into a spiral clutch face having a jaw portion 26 coacting the jaw 20 on the connector shaft 16. A pilot portion 27 on the drive shaft extends into the bore 21 to keep the two shafts alined and to engage the outer plug 23. Slidably positioned within the barrel 3 and positioned around the drive shaft 24 is a sleeve 28 that bears against the forward side of the flange 25. The sleeve 28 is connected intermediate of its ends and along its bottom side to a trigger 29 secured in place by the cap screw 30. The trigger projects through a hole 31 at the bottom of the barrel 3 and, as is shown in Fig. 4, the hole 31 is larger longitudinally than the portion of the trigger which projects therethrough. The trigger 29 and the sleeve 28 can thus be moved axially by a distance determined by the size of the hole 31. Rearward pressure on the trigger will thus move the sleeve 28 and the drive shaft 24 rearwardly to engage the clutch jaw 26 and 20 to drive the drive shaft from the connector shaft 16. The spring 22 functions to bias the clutch elements to disengaged position. In the example of the drill illustrated, the drive shaft is arranged to be given a right hand or clockwise rotation when viewed from the rear.

The top of the sleeve 28 is cut away just forwardly of the point of connection of the trigger 29 to the sleeve as at 32 (see Fig. 4), and the top of the barrel 3 is cut away as at 33 to form registering openings positioned at the top of the thickened portion 4 of the barrel. The forward end of the drive shaft 24 has an elongated drive gear 34 formed thereon and positioned below these registering openings. The housing 5 is positioned over the openings in the barrel and sleeve and is provided toward its rear end with a bearing 35 that rotatably supports the tube 36 of a first driven gear 37. The gear 37 is constantly in mesh with the drive gear 34.

The tubular rest guide 9 is provided with a flange 38 that closes the front end of the housing 5 and is further provided with a rearward extension that is sleeved into the forward end of the housing. A bearing 40 in the rear end of the rest guide slidably supports an elongated nut 41 having a cylindrical outer surface. The rear end of the nut 41 projects through the first driven gear 37 but is not engaged therewith. Rearwardly from the bearing 40 the exterior of the nut 41 rotatably supports a second driven gear 42. The opposed faces of the driven gears 37 and 42 are provided with clutch jaws 43 and 44 respectively and the two gears are held in fixed axial relationship by a sleeve 45. The elongated nut 41 is provided with an annular exterior flange 46 having clutch jaws formed on its opposed faces and adapted to drivingly engage jaws 43 and 44 of the gears 37 and 42.

As is most clearly illustrated in Figs. 2 and 3 the rearwardly extended portion 49 of the rest guide 9 carries a pin 47 that rotatably supports an idler gear 48. The gear 48 meshes with the drive gear 34 and with the second driven gear 42 to rotate the second gear opposite from the first gear 37.

The rest rod 10 is slidably and non-rotatably engaged with the forward end of the rest guide 9 and is provided with an elongated threaded shank 49 threaded into the nut 41. The rear of the housing 5 has a rearwardly projecting and chambered portion 50 in which is positioned a spring 51. The spring 51 connecting through the thrust collar 52 engages the rear end of the nut 41 and thus constantly urges the nut and the rest rod forwardly. The clutch flange 46 on the nut 41 is therefore biased toward driving engagement with the jaw 44 on the second driving gear 42, but rearward pressure on the rest rod relative to the remainder of the drill will cause the nut 41 to be drivingly engaged with the jaw 42 and the first driving gear 37. The threaded portion 49 of the rest rod and the nut 41 have left hand threads so that rotation of the nut by the first driving gear 37 causes the rest rod to be retracted rearwardly into the housing 5 and its rear extension 50. Rotation by the second driving gear 42 while in engagement with the clutch flange 46 will advance the rest rod forwardly and outwardly from the rest guide 9.

It is particularly pointed out that forward end of the rest rod 10 is flattened into general D shape cross section as at 53 to have a non-rotating sliding engagement with the forward end of the tubular rest guide that is similarly apertured. This leaves a forwardly facing stop 54 on the rest rod that coacts with the rest guide 9 to prevent the rest rod being driven forwardly out of the tool and the nut 41. When the stop 54 engages the end of the rest guide and thus prevents further forward movement of the rest rod, continued rotation of the nut 41 by the second driven gear 42 will cause the nut 41 to travel rearwardly on the threaded portion of the rest rod. The flange 46 on the nut thus automatically disengages itself from the second driven to prevent jamming of the gears and threads in the drill. The rear end of the threaded shank 49 of the rest rod extends into the spring 51 and engages the end of the extension 50 in the retracted position of the rest rod. In this extreme position of the rest rod continued rotation of the nut 41 by the first driven gear 37 will cause the nut to travel forwardly and disengage itself from the first driven gear to prevent jamming of the several gears.

The shank 8 of the tool bit 8A is releasably located in the bit holding tube 7 by a chucked arrangement illustrated in Figs. 4 and 6. The rear end of the shank 8 is transversely cut away and bevelled as at 55 and is also notched as at 56 along a line extending transversely of the shank and at 90 degrees to the bevelled end 55. The internal wall of the bit holding tube 7 is provided with two axially facing projections 57 and 58 as is most clearly illustrated in Fig. 6. A plunger 59 is positioned in the rear end tube 7 and biased forwardly by a spring 60. The head of the plunger 59 is cut away transversely as at 61 to clear the rear projection 57 in the tube and to prevent rotation of the plunger. The forward end of the plunger is axially cammed as at 62 to be engaged by the rear bevelled end 55 of the shank of the tool bit. To install the bit in the drill the bevelled end 55 is pressed inwardly past the first projection 58 in the tube 7 and against the spring pressed plunger 59 until the notch 56 is opposite the projection 58. The tool bit is then rotated 90 degrees to engage the projection 58 in the notch 56 to prevent withdrawal of the bit. The spring pressed head of the plunger is then pressed forwardly with the bevelled end 62 in engagement with the bevelled end 55 of the bit shank to prevent accidental disengagement of the bit from the tube. The rear end of the bit holding tube 7 is connected to the forward end of the drive gear 34 by a set screw 63.

In operation of the drill the bit 8A can be

caused to rotate by pulling of the trigger 9 as previously explained. If there is no pressure on the bit on the rest rod 10 at this time the idler gear 48 and second driven gear 42 will then cause the rest rod to be advanced. This manual control of the drill may be used to register the end of the rest with the bit as is shown in Figs. 1 and 4.

With the trigger 29 released both bit 8A and the rest rod 10 can be pressed against the work as indicated in Fig. 7. Pressure on the bit automatically engages the clutch 20, 26 so that the bit rotates to drill into the work. Simultaneously the pressure on the rest rod 10 engages the clutch flange 46 with the first driven gear 47 to retract the rest into the rest guide 9. This permits the bit to advance into the work relative to the end of the rest rod. When the bit cuts through the rigid work such as a bone the axial pressure on the bit is automatically relieved and the driving connection to the bit is automatically disengaged. This stops the rotation of the drive gear 34 so that rotation of the nut 41 and retraction of the rest rod is also automatically stopped. It is thus impossible for the surgeon to accidently permit the bit to run longer than is necessary and it is also impossible for the surgeon to accidently permit the entire drill and bit to move forwardly to damage soft tissues located on the inside of the bone.

I have described a highly practical form of my drill. I have not attempted to describe other possible modifications of the details of the drill as it is believed that this disclosure will permit others to make and operate my drill with such modifications as may be desired.

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

1. In a surgical drill having a tubular body with a grip projecting therefrom, a tubular bearing in said body and having an external flange seated against a forwardly facing shoulder in said body, a connector shaft journaled in said bearing and having an enlarged inner end bearing against the inner end of the bearing, the outer end of said connector shaft being adapted to receive a driving element through the rear end of said body, a sleeve slidably positioned in said barrel and spaced forwardly of said connector shaft, a trigger connected to said sleeve and projecting through an aperture in said barrel, said trigger and the edges of said aperture coacting to limit motion of said sleeve, a drive shaft rotatable within said sleeve and having an enlarged rear end bearing against the rear end of said sleeve, the rear end of said drive shaft and the forward end of said connector shaft having coacting axially disengageable clutch faces, a spring positioned between said shafts and biasing said clutch faces apart, a bit holding tube journaled in the forward end of said barrel and connected to said drive shaft for movement therewith, lock means in said tube adapted to removably retain the shank of a bit in said tube, an elongated drive gear on said drive shaft, a housing secured to the outside of said barrel opposite said gear, said barrel having an opening formed therein and opening to said housing, a first gear rotatably supported in the rear of said housing and meshing with said drive gear, a tubular rest guide secured at the front of said housing and having a rear portion projecting thereinto, an idler gear supported by said rearwardly projecting portion of said rest guide and meshing with said drive gear, a rest rod slidably and non-rotatably mounted in said rest guide and having a work engaging point projecting from the forward end thereof, an elongated threaded shank on the rear end of said rod and extending into said housing, an elongated nut threaded on the shank of said rod and having a cylindrical forward end journaled in said rest guide, a second gear rotatable on the forward end of said nut and meshing with said idler gear, a flange on said nut positioned between said first and second gears and having rotatively oppositely facing clutch surfaces on the opposite ends thereof, the opposed faces of said first and second gears having clutch faces thereon adapted to coact with the clutch faces on the flange of said nut, a spacer sleeve positioned between said first and second gears and spacing the clutch faces thereon by a distance slightly greater than the axial length of the flange on said nut, a spring compressed between said housing and the rear end of said nut, and a forwardly facing stop on said rod coacting with a rearwardly facing portion within said rest guide to limit forward motion of said rod, the rear end of said rod coacting with the inside of said housing to limit rearward movement of said rod.

2. In a surgical drill having a tubular body with a grip projecting therefrom, a tubular bearing in said body and having an external flange seated against a forwardly facing shoulder in said body, a barrel extending into said body from the forward end thereof and engaging said flange, means retaining said barrel in said body, a connector shaft journaled in said bearing and having an enlarged inner end bearing against the inner end of the bearing, the outer end of said connector shaft being adapted to receive a driving element through the rear end of said body, a sleeve slidably positioned in said barrel and spaced forwardly of said connector shaft, a trigger connected to said sleeve and projecting through an aperture in said barrel, said trigger and the edges of said aperture coacting to limit axial motion of said sleeve, a drive shaft rotatable within said sleeve and having an enlarged rear end bearing against the rear end of said sleeve, the rear end of said drive shaft and the forward end of said connector shaft having coacting axially disengageable clutch faces, a spring biasing said clutch faces apart, a bit holding tube journaled in the forward end of said barrel and connected to said drive shaft for movement therewith, lock means in said tube adapted to removably retain the shank of a bit in said tube an elongated drive gear on said drive shaft, a housing secured to the outside of said barrel opposite said gear, said barrel having an opening formed therein and opening to said housing, a first gear rotatably supported in the rear of said housing and meshing with said drive gear, a tubular rest guide secured at the front of said housing and spaced forwardly of said first gear and meshing with said drive gear, a rest rod slidably and nonrotatably mounted in said rest guide and having a work engaging point projecting from the forward end thereof, an elongated threaded shank on the rear end of said rod and extending into said housing, an elongated nut threaded on the shank of said rod, a second gear rotatable on the forward end of said nut and meshing with said idler gear, a flange on said nut positioned between said first and second gears and having rotatively oppositely facing clutch

surfaces on the opposite ends thereof, the opposed faces of said first and second gears having clutch faces thereon adapted to coact with the clutch faces on the flange of said nut, a spacer sleeve positioned between said first and second gears and spacing the clutch faces thereon by a distance slightly greater than the axial length of the flange on said nut, a spring compressed between said housing and the rear end of said nut, and a forwardly facing stop on said rod coacting with a rearwardly facing portion within said rest guide to limit forward motion of said rod, the rear end of said rod coacting with the inside of said housing to limit rearward movement of said rod.

3. In a surgical drill having a tubular body with a grip projecting therefrom, a tubular bearing in said body, a barrel extending into said body from the forward end thereof, means retaining said barrel in said body, a connector shaft journaled in said bearing and having an enlarged inner end, the outer end of said connector shaft being adapted to receive a driving element through the rear end of said body, a sleeve slidably positioned in said barrel and spaced forwardly of said connector shaft, a trigger connected to said sleeve and projecting through an aperture in said barrel, said trigger and the edges of said aperture coacting to limit axial motion of said sleeve, a drive shaft rotatable within said sleeve and having an enlarged rear end bearing against the rear end of said sleeve, the rear end of said drive shaft and the forward end of said connector shaft having coacting axially disengageable clutch faces, a spring biasing said clutch faces apart, a bit holding tube journaled in the forward end of said barrel and connected to said drive shaft for movement therewith, lock means in said tube adapted to removably retain the shank of a bit in said tube, gear teeth on said drive shaft, a housing secured to the outside of said barrel opposite said gear teeth, said barrel having an opening formed therein and opening to said housing, a first gear rotatably supported in the rear of said housing and meshing with said teeth, a tubular rest guide secured at the front of said housing, an idler gear rotatably supported in said housing and spaced forwardly of said first gear and meshing with said teeth, a rest rod slidably and non-rotatably mounted in said rest guide and having a work engaging point projecting from the forward end thereof, an elongated threaded shank on the rear end of said rod and extending into said housing, an elongated nut threaded on the shank of said rod, a second gear rotatable about the forward end of said nut and meshing with said idler gear, a flange on said nut positioned between said first and second gears and having rotatively oppositely facing clutch surfaces on the opposite ends thereof, the opposed faces of said first and second gears having clutch faces thereon adapted to coact with the clutch faces on the flange of said nut, means spacing said first and second gears and spacing the clutch faces thereon by a distance slightly greater than the axial length of the flange on said nut, a spring compressed between said housing and the rear end of said nut, and a forwardly facing stop on said rod coacting with a rearwardly facing portion within said rest guide to limit forward motion of said rod, the rear end of said rod coacting with the inside of said housing to limit rearward movement of said rod.

4. In a surgical drill having a tubular body with a grip projecting therefrom, a barrel extending into said body from the forward end thereof, means retaining said barrel in said body, a connector shaft journaled in said body, the outer end of said connector shaft being adapted to receive a driving element through the rear end of said body, a sleeve slidably positioned in said barrel and spaced forwardly of said connector shaft, a trigger connected to said sleeve and projecting through an aperture in said barrel, said trigger and the edges of said aperture coacting to limit axial motion of said sleeve, a drive shaft rotatable within said sleeve and having an enlarged rear end bearing against the rear end of said sleeve, the rear end of said drive shaft and the forward end of said connector shaft having coacting axially disengageable clutch faces, a spring biasing said clutch faces apart, means in the forward end of said barrel for connecting a tool bit to said drive shaft for movement therewith, drive gear teeth on said drive shaft, a housing secured to the outside of said barrel opposite said gear teeth, said barrel having an opening formed therein and opening to said housing, a first gear rotatably supported in the rear of said housing and meshing with said drive gear teeth, a tubular rest guide projecting forwardly from said housing, an idler gear supported in said housing and meshing with said drive gear teeth, a rest rod slidably and non-rotatably mounted in said rest guide and having a work engaging point projecting from the forward end thereof, an elongated threaded shank on the rear end of said rod and extending into said housing, a nut threaded on the shank of said rod, a second gear rotatable in the forward end of said housing and meshing with said idler gear, a flange on said nut positioned between said first and second gears and having rotatively oppositely facing clutch surfaces on the opposite ends thereof, the opposed faces of said first and second gears having clutch faces coacting with the clutch faces on the flange of said nut, means spacing said first and second gears and the clutch faces thereon by a distance slightly greater than the axial length of the flange on said nut, a spring compressed between said housing and rear end of said nut to bias said nut axially, a forwardly facing stop on said rod coacting with a rearwardly facing portion within said rest guide to limit forward motion of said rod, the rear end of said rod coacting with the inside of said housing to limit rearward movement of said rod

5. In a surgical drill having a tubular body with a grip projecting therefrom, a barrel extending into said body from the forward end thereof, means retaining said barrel in said body, a connector shaft journaled in said body, the outer end of said connector shaft being adapted to receive a driving element through the rear end of said body, a sleeve slidably positioned in said barrel and spaced forwardly of said connector shaft, a trigger connected to said sleeve and projecting through an aperture in said barrel, said trigger and the edges of said aperture coacting to limit axial motion of said sleeve, a drive shaft rotatable within said sleeve and having an axially facing driven engagement with said sleeve, the rear end of said drive shaft and the forward end of said connector shaft having coacting axially disengageable clutch faces, a spring biasing said clutch faces apart, means in the forward end of said barrel for connecting a tool bit to said drive shaft for movement therewith, drive gear teeth on said drive shaft, a housing secured to the outside of said barrel opposite said

gear teeth, said barrel having an opening formed therein and opening to said housing, a first gear rotatably supported in said housing and meshing with said drive gear teeth, a tubular rest guide projecting forwardly from said housing, an idler gear supported in said housing and meshing with said drive teeth, a rest rod slidably and non-rotatably mounted in said rest guide and having a work engaging point projecting from the forward end thereof, an elongated threaded shank on the rear end of said rod and extending into said housing, a nut threaded on the shank of said rod, a second gear rotatable in said housing and meshing with said idler gear, a flange on said nut positioned between said first and second gears and having rotatively oppositely facing clutch surfaces on the opposite ends thereof, the opposed faces of said first and second gears having clutch faces thereon adapted to coact with the clutch faces on the flange of said nut, means spacing said first and second gears and the clutch faces thereon by a distance slightly greater than the axial length of the flange of said nut, a spring compressed between said housing and said nut to bias said nut axially, and a forwardly facing stop on said rod coacting with a rearwardly facing portion within said rest guide to limit forward motion of said rod, the rear end of said rod coacting with the inside of said housing to limit rearward movement of said rod .

6. In a surgical drill having a body with a grip projecting therefrom, a connector shaft journaled in said body and having an outer end adapted to receive a driving element through the rear end of said body, a sleeve slidably positioned in said body and spaced forwardly of said connector shaft, a trigger connected to said sleeve and projecting through an aperture in said body, said trigger and the edges of said aperture coacting to limit axial motion of said sleeve, a drive shaft rotatable within said sleeve, the rear end of said drive shaft and the forward end of said connector shaft having coacting axially disengageable clutch faces, a spring biasing said clutch faces apart, a bit journaled in the forward end of said body and releasably connected to said drive shaft for movement therewith, a drive gear on said drive shaft, a housing secured to the outside of said body opposite said gear, said body having an opening formed therein and opening to said housing, a first gear rotatably supported in the rear of said housing and meshing with said drive gear, a tubular rest guide secured at the front of said housing and having a rear portion projecting thereinto, an idler gear supported by said rearwardly projecting portion of said rest guide and meshing with said drive gear, a rest rod slidably and non-rotatably mounted in said rest guide and having a work engaging point projecting from the forward end thereof, an elongated threaded shank on the rear end of said rod and extending into said housing, an elongated nut threaded on the shank of said rod, a second gear rotatable about the forward end of said nut and meshing with said idler gear, a flange on said nut positioned between said first and second gears and having rotatively oppositely facing clutch surfaces on the opposite ends thereof, the opposed faces of said first and second gears having clutch faces thereon adapted to coact with the clutch faces on the flange of said nut, means positioned between said first and second gears and spacing the clutch faces thereon by a distance slightly greater than the axial length of the flange on said nut, a spring compressed between said housing and the rear end of said nut, and a forwardly facing stop on said rod coacting with a rearwardly facing portion within said rest guide to limit forward motion of said rod, the rear end of said rod coacting with the inside of said housing to limit rearward movement of said rod.

7. In a surgical drill having a body with a grip projecting therefrom, a connector shaft journaled in said body and having an outer end adapted to receive a driving element through the rear end of said body, a sleeve slidably positioned in said body and spaced forwardly of said connector shaft, a trigger connected to said sleeve and projecting through an aperture in said body, said trigger and the edges of said aperture coacting to limit axial motion of said sleeve, a drive shaft rotatable within said sleeve, the rear end of said drive shaft and the forward end of said connector shaft having coacting axially disengageable clutch faces, a spring biasing said clutch faces apart, a bit journaled in said body and releasably connected to said drive shaft for movement therewith, a drive gear on said drive shaft, a housing secured to the outside of said body opposite said gear, said body having an opening formed therein and opening to said housing, a first gear rotatably supported in said housing and meshing with said drive gear, a tubular rest guide secured at the front of said housing, an idler gear supported by said rest guide and meshing with said drive gear, a rest rod slidably and non-rotatably mounted in said rest guide and having a work engaging point projecting from the forward end thereof, an elongated threaded shank on the rear end of said rod and extending into said housing, an elongated nut threaded on the shank of said rod, a second gear rotatable about the forward end of said nut and meshing with said idler gear, a flange on said nut positioned between said first and second gears and having rotatively oppositely facing clutch surfaces on the opposite ends thereof, the opposed faces of said first and second gears having clutch faces thereon adapted to coact with the clutch faces on the flange of said nut, means positioned between said first and second gears and spacing the clutch faces thereon by a distance slightly greater than the axial length of the flange on said nut, a spring compressed between said housing and the rear end of said nut, and a forwardly facing stop on said rod coacting with a rearwardly facing portion within said rest guide to limit forward motion of said rod, the rear end of said rod coacting with the inside of said housing to limit rearward movement of said rod.

8. In combination with a surgical drill having a body with a drive shaft therein adapted to drive a tool bit, a connector shaft in said body adapted to be connected to a source of power, clutch means drivingly connecting said shafts and disengageable by movement of said drive shaft forwardly from said body, a spring biasing said drive shaft to clutch disengaging position, a tool rest rod slidably mounted on said body and projecting forwardly therefrom parallel to said drive shaft, a threaded shank on said rest rod, a pair of gears rotatably mounted in said body coaxially with said shank and spaced axially therealong, a nut threaded on said shank and having a flange positioned between said pair of gears, means drivingly connecting the gears of said pair of gears to said drive shaft for opposite rotation thereby, the opposed ends of said pair of gears having clutch faces thereon, said flange on said nut having opposite clutch faces alternatively engageable

with said clutch faces on said pair of gears, means biasing said nut forwardly to engage the flange thereon with the forward one of said pair of gears, and stop portions on said rod adapted to coact with fixed portions of said body to limit axial motion of said rod.

9. In combination with a surgical drill having a body with a drive shaft therein adapted to drive a tool bit, a connector shaft in said body adapted to be connected to a source of power, clutch means drivingly connecting said shafts and disengageable by axial movement of said drive shaft forwardly from said body, a trigger relatively rotatively and axially connected to said drive shaft and projecting from said body, a spring biasing said drive shaft to clutch disengaging position, a tool rest rod slidably mounted on said body and projecting forwardly therefrom parallel to said drive shaft, a threaded shank on said rest rod, a pair of gears rotatably mounted in said body and spaced axially along said shank, a nut threaded on said shank and having a flange positioned between the gears of said pair of gears, means drivingly connecting the gears of said pair of gears to said drive shaft for opposite rotation thereby, the opposed ends of said pair of gears having clutch faces thereon, said flange on said nut having opposite clutch faces alternatively engagable with said clutch faces on said pair of gears by axial motion of said nut means biasing said nut forwardly to engage

the flange thereon with the forward one of said pair of gears, and stop portions on said rod adapted to coact with fixed portions of said body to limit axial motion of said rod.

10. In combination with a surgical drill having a body with a drive shaft therein adapted to drive a tool bit, a connector shaft in said body adapted to be connected to a source of power, clutch means drivingly connecting said shafts and disengageable by axial movement of said drive shaft forwardly from said body, a trigger relatively rotatively and axially connected to said drive shaft and projecting from said body, a spring biasing said drive shaft to clutch disengaging position, a tool rest rod slidably mounted on said body and projecting forwardly therefrom parallel to said drive shaft, a threaded shank on said rest rod, a pair of gears rotatably mounted in said body and spaced axially along said shank, a nut threaded on said shank and having a flange positioned between the gears of the said pair of gears, means drivingly connecting the gears of said pair of gears to said drive shaft for opposite rotation thereby, said flange on said nut being alternatively engageable with said pair of gears by axial motion of said nut and means biasing said nut forwardly to engage the flange thereon with the forward one of said pair of gears.

No references cited.