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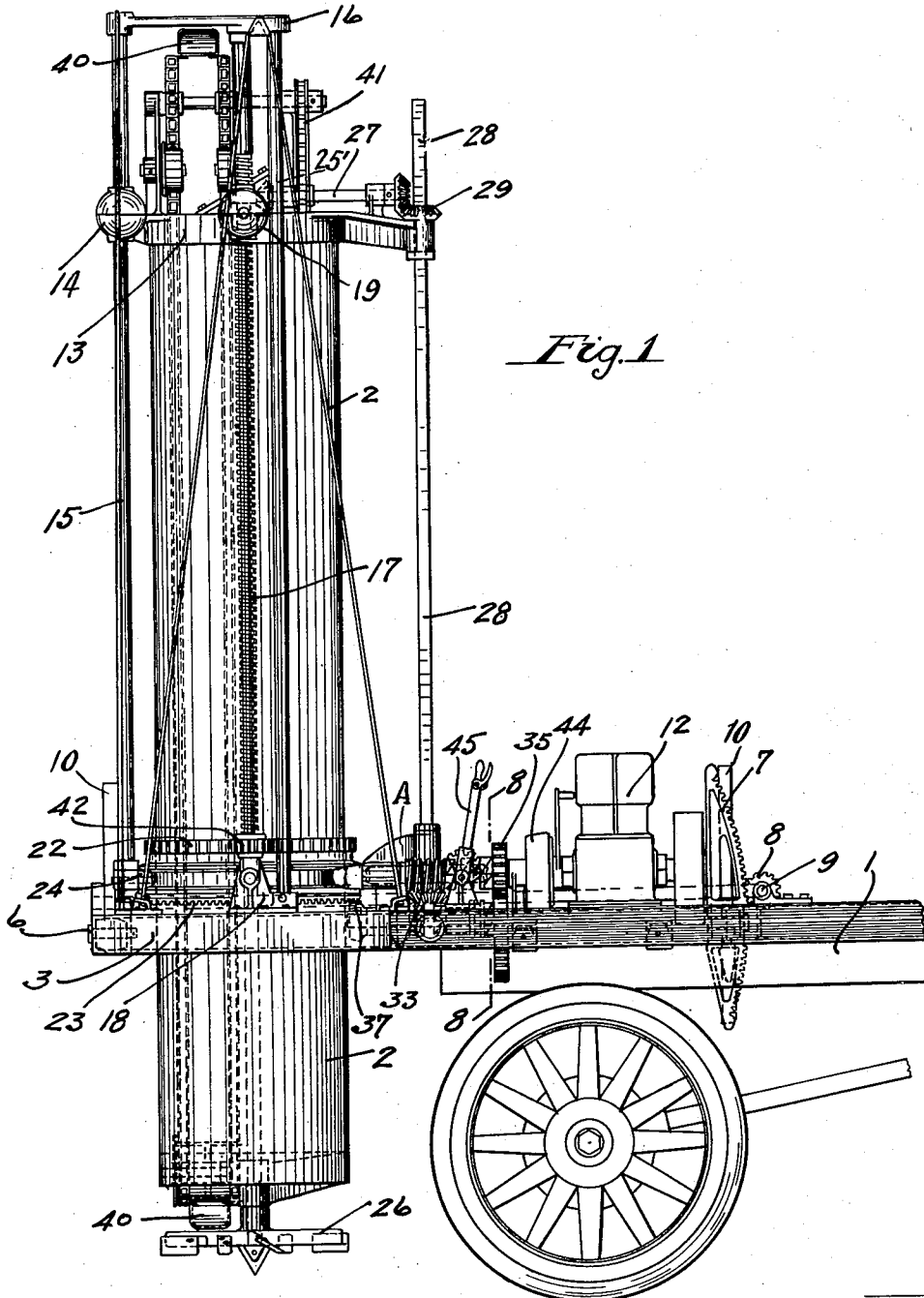
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MACHINE FOR DIGGING POSTHOLES AND THE LIKE

Filed March 19, 1924

4 Sheets-Sheet 1



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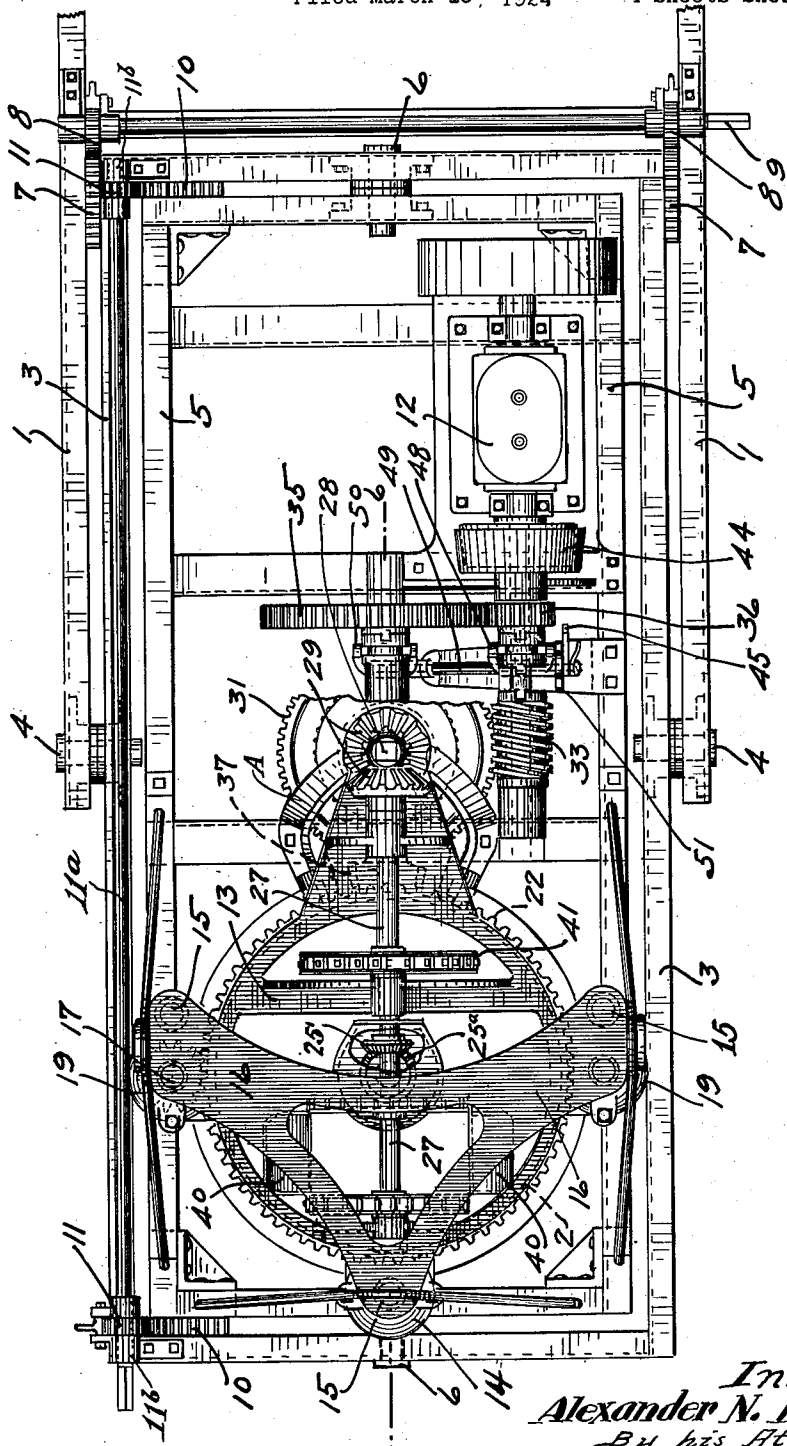
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Fig. 2



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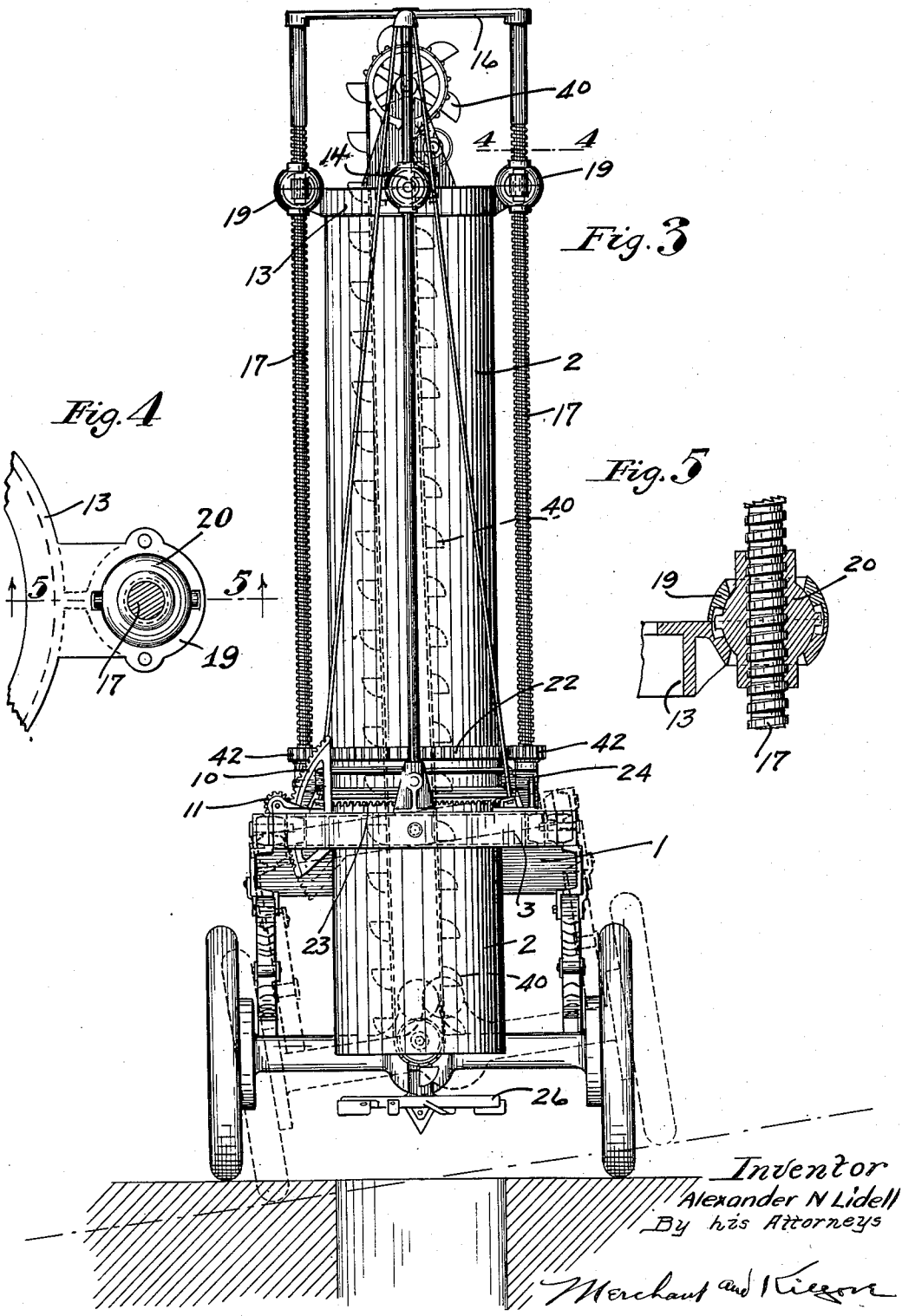
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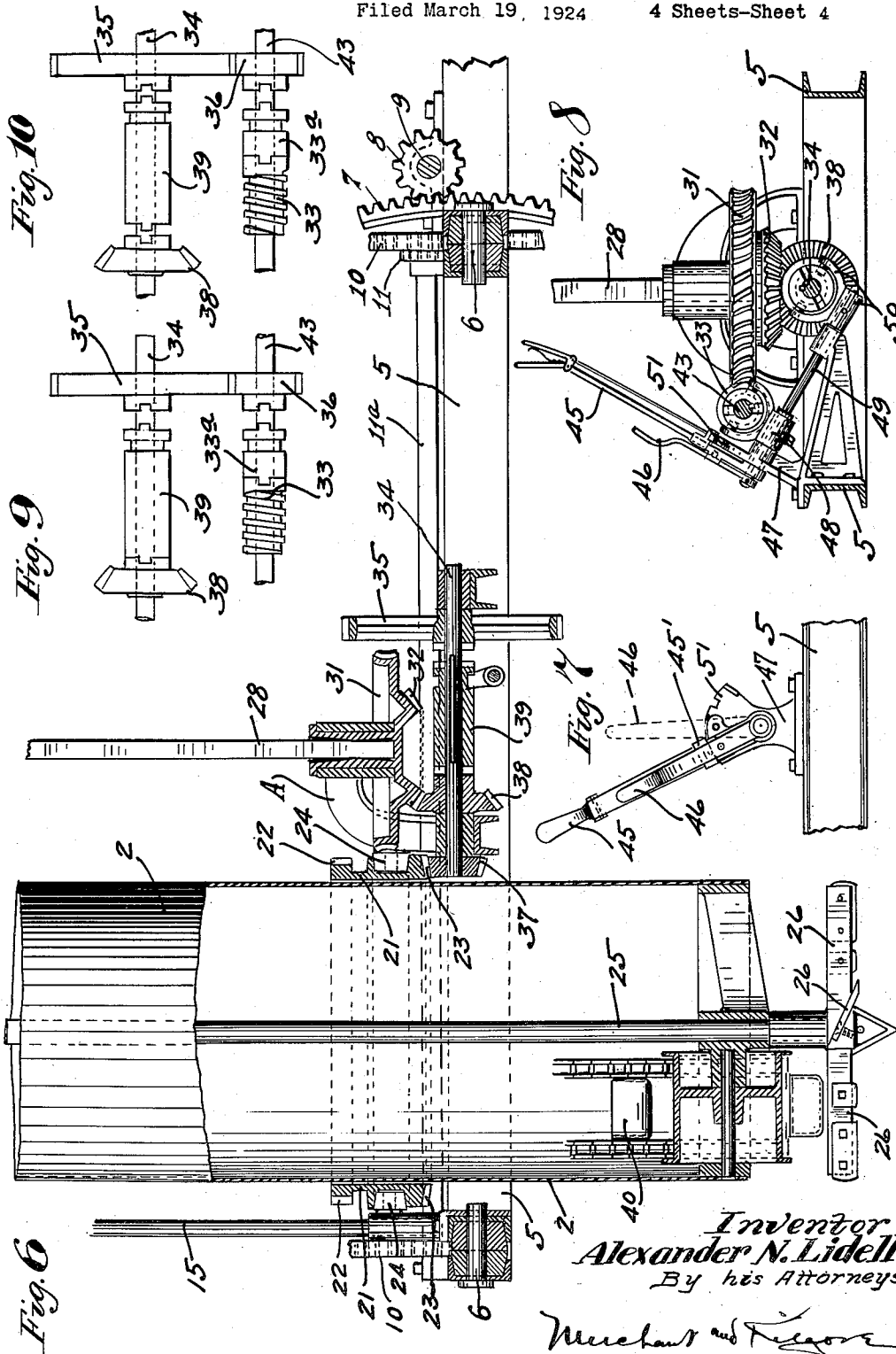
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UNITED STATES PATENT OFFICE.

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MACHINE FOR DIGGING POSTHOLES AND THE LIKE.

Application filed March 19, 1924. Serial No. 700,408.

My invention provides a highly efficient apparatus for use in sinking foundation tubes, boring post holes in the ground, and performing similar work, and, generally stated, the invention consists of the novel devices and combinations of devices hereinafter described and defined in the claims. This improved boring device may be made in various different sizes for use in boring in the earth large holes several feet in diameter or for boring holes a foot or less in diameter. One of its important commercial uses is the boring of holes for telegraph and telephone poles, but it may be used for boring holes very much greater in depth than required for such poles. The present invention is in the nature of an improvement on the apparatus entitled "Device for sinking foundation tubes", disclosed and claimed in Letters Patent No. 1,154,137, issued to H. Sletten and myself, A. N. Lidell, of date September 21, 1915. A commercial form of the boring device is illustrated in the accompanying drawings, wherein like characters indicate like parts throughout the several views.

Referring to the drawings:

Fig. 1 is a side elevation showing one of the improved boring devices mounted on a truck, the front portion of which truck is broken away;

Fig. 2 is a plan view of the parts shown in Fig. 1;

Fig. 3 is a rear elevation of the parts shown in Figs. 1 and 2;

Fig. 4 is a fragmentary horizontal section on the line 4—4 of Fig. 3;

Fig. 5 is a fragmentary vertical section on the line 5—5 of Fig. 4;

Fig. 6 is a vertical section chiefly on the line 6—6 of Fig. 2, some parts being shown in full and some parts being broken away;

Fig. 7 is a fragmentary view in side elevation showing the clutch-operating lever;

Fig. 8 is a tranverse vertical section taken approximately on the line 8—8 of Fig. 1; and

Figs. 9 and 10 are diagrammatic views in plan illustrating clutch mechanism for driving the various running parts of the boring device.

The boring device is mounted on a truck 1 and comprises a large non-rotary vertically movable cylindrical casing 2 arranged to move vertically through a large opening in the rear portion of a primary bed frame 3,

that is intermediately pivoted at 4, to the truck frame 1. Located within the primary frame 3 is a secondary bed frame 5, which, at its ends, is intermediately pivoted to the frame 3 at 6, (see Figs. 2 and 6). The frame 3 can be tilted on the pivots 4 by segments 7 and intermeshing pinions 8 on a cross shaft 9. The frame 5 can be tilted on the pivot 6 by gear segments 10 and cooperating pinions 11, (see Figs. 2 and 3). The pinions 11 are secured to a long shaft 11^a mounted in suitable bearings 11^b on the bed frame 3. Hence, the frame 5 can be always set level, irrespective of whether or not the truck stands level, and, consequently, the casing 2 can always be set in a true vertical position, over the place where the post hole is to be bored.

The engine 12 is mounted on the frame 5. Secured on the upper end of the casing 2 is a substantially annular bracket 13 provided with an outstanding guide bearing 14, that is much like the guide 19 but that slides freely on one of three upright guide rods 15, which, at their lower ends, are rigidly secured to the frame 5. The upper ends of the guide rods 15 are rigidly connected by a tie plate 16. For moving the casing 2 vertically, there are two upright screw rods 17 journaled, at their upper ends, in the tie plate 16 and, at their lower ends, in brackets 18 on the frame 5. The annular bracket 13 is provided with outstanding sockets 19 in which are held self-adjusting non-rotary sleeve nuts 20 that work with threaded engagement on the two rods 17, (see particularly Figs. 1, 3 and 5).

Surrounding and loosely engaging, but guiding the intermediate portion of the casing 2, is a large rotary collar 21 that carries the spur gear 22 and annular beveled gear 23, (see particularly Fig. 6). The collar 21 has an annular groove that adapts it to run on circumferentially spaced bearing rollers 24, suitably mounted in a bracket A secured on the frame 5 and in other suitable bearings on said frame.

Journaled in suitable bearings on the upper and lower ends of the casing 2, is an upright boring shaft 25 which, at its lower end, just below the casing, has a boring tool 26. This shaft 25 and tool 26, of course, move vertically with the casing. This shaft 25 is driven through mitre gears 25^a and 25^b from a short shaft 27 mounted on the bracket 13 and driven from but slidable

in respect to an upright square shaft 28 through gears 29. The shaft 28, at its lower end, is driven by a sleeve secured to the worm gear 31 and beveled gear 32, (see Figs. 6 and 8). The worm gear 31 is driven by a worm 33 loose on the extension of an engine-driven shaft 43, but adapted to be connected thereto by slidable clutch sleeve 33^a, (see Figs. 2, 6, 9 and 10).

The numeral 34 indicates a countershaft driven from the engine crank shaft through loose gears 35 and 36 and provided at its extended end with a rigidly secured beveled pinion 37 that meshes with the annular gear 23. The numeral 38 indicates a beveled gear loose on the shaft 34 and meshing with the beveled gear 32. The numeral 39 indicates a double-ended clutch sleeve driven by but slidable on the shaft 34.

Working within the casing 2 is an endless bucket-equipped elevator belt 40 that runs over suitable upper and lower guide wheels and is driven from the upper shaft 27 through a sprocket and chain drive 41.

When the clutch sleeve 39 is engaged with the beveled gear 38 and the clutch sleeve 33^a is engaged with the worm 33, the boring tool will be rotated, the elevator belt will be driven, and the casing 2 will be fed slowly downward. The dirt loosened up by the boring tool will be picked up and elevated by the elevator belt and delivered out of the upper end of the drum. When the sleeve 39 is engaged with the wheel 35 and the sleeve 33^a is engaged with the wheel 36, neither the boring tool nor the elevator belt will be driven, but the screw shafts 17 will be driven in a reverse direction so as to elevate the casing 2. Rotary movements are imparted to the pinions 42 and, hence, to the screw rods 17 by rotation of the annular gear 22 and, as is evident, rotary movements of said screw rods acting on the nut blocks 20 will raise or lower the casing 2 according to the indication of rotation of said screw rods.

The double-ended clutch sleeve 33^a is keyed to slide on but rotate with the shaft 43, which, by a clutch 44, shown as of the friction cone type, is connected to the engine crank shaft in the well known manner.

For operating the double-ended clutch sleeves 33^a and 39, respectively, I provide clutch levers 45 and 46, (see particularly Figs. 7 and 8). The lever 45 has a sleeve-like hub journaled to a bracket 47 on the frame 5. The sleeve-like hub of said lever 45 carries a shipper fork 48 that is engageable with a groove in the clutch sleeve 33^a. The lever 46 is secured to a shaft 49 that is extended through the sleeve-like hub of the lever 45, is journaled in the bearing bracket 47, and at its inner end is provided with a shipper fork 50 that engages a groove in the clutch sleeve 39. The lever 45 has a

latch adapting it to be secured in different positions to a notched segment 51 secured on the bracket 47. The lever 46 is normally engaged with a notched lug 45' on the lever 45, so that the two levers will move together, but said lever 46 is adapted to be sprung out of engagement with the said lug, so that the two levers may be independently moved when desired.

By manipulation of the levers 45 and 46, the clutch members 39 and 33^a may be shifted, at will. When the said clutch members are adjusted as shown in Fig. 9, the bucket-equipped elevator belt and boring shaft 25 will be driven and, moreover, the annular gear structure 21-22-23 will be rotated, thereby driving the screw rods 17 and causing the entire casing and the boring mechanism proper to be lowered. When the clutch members are adjusted as shown in Fig. 10, the boring tool and the elevator belt will be driven, but the annular gear structure 21-22-23 will not then be rotated because the shaft 34 will not at such time be rotated and, thence, there will then be no downward feed of the casing and boring tool. To impart upward feed movement to the casing without driving either the elevator belt or boring tool, it is only necessary to move the clutch 39 into its intermediate idle position and to engage the clutch 33^a with the clutch on the pinion 36.

What I claim is:

1. The combination with a supporting frame, of a non-rotary cylindrical casing supported from said frame but mounted for vertical movements in respect thereto, an elevator within said casing, a boring tool immediately below said casing, means for driving said elevator while permitting vertical movements thereof with said casing, an annular intermediate driving gear mounted to rotate around said casing, screw rods and nut-acting elements operative to raise and lower said casing pinions on said screw rods driven from said annular gear, and bore driving connections for rotating said annular gear.

2. The combination with a supporting frame, of a collar rotatively mounted on said frame, a cylindrical casing mounted to move vertically through said collar, upright guide rods supported by said frame in the vicinity of the exterior of said casing, a bracket secured to the upper end of said casing and having bearings slidable on said upright guide rods to hold said casing against rotation, an elevator working within said casing, a boring tool working below said casing and having a shaft extending upward therethrough, an upright power-driven shaft mounted on said frame at the exterior of said casing, means connecting the upper end of said upright shaft to the shaft of said boring tool while permitting

vertical movements of said casing, upright screw-threaded feed rods at the exterior of said casing, the bracket at the upper end of said casing having nut-acting elements engaging said feed rods, means for rotating said collar, and means for rotating said screw-threaded feed rods from said collar.

3. The structure defined in claim 2 in which the nut-acting elements carried by the bracket at the upper end of said casing are mounted for universal wobbling movements to adjust themselves to slight variations in the relative positions of the feed screws.

4. The structure defined in claim 2 in further combination with a tie plate rigidly connecting the upper ends of said guide rods and affording bearings for the upper ends of said screw-threaded feed rods.

5. The combination with a supporting frame, of a large collar rotatively mounted on said frame and provided with an annular bevel gear and an annular spur gear, a non-rotary cylindrical casing mounted to move vertically through said collar, upright guide rods, bearings secured to the upper end of said casing and slidable on said guide rods, upright screw-threaded feed rods, nut-acting elements on said casing working on

said feed rods, said feed rods having pinions meshing with the spur gear on said collar, a countershaft provided with a bevel pinion engaging the bevel gear on said collar to rotate the same, an elevator working in said casing, a boring tool working below said casing and having a shaft extended upward therethrough, means for driving said elevator and said boring tool, comprising a countershaft carried by the upper end of said casing, an upright driving shaft at the exterior of said casing, bevel gears connecting said countershaft and upright driving shaft while permitting vertical movements of the casing, and means for rotating said upright driving shaft and the countershaft.

6. The structure defined in claim 5 in which said latter noted means includes a bevel gear on the lower end of said upright driving shaft, a bevel pinion loose on the first noted countershaft and meshing with the bevel gear on the lower end of said upright driving shaft, and a clutch for connecting said first noted countershaft to the loose pinion just noted.

In testimony whereof I affix my signature.

ALEXANDER N. LIDELL.