

No. 749,841.

PATENTED JAN. 19, 1904.

G. F. CAMPBELL & S. T. ISHERWOOD.

PORTABLE ELECTRICALLY DRIVEN DRILLING APPARATUS.

APPLICATION FILED NOV. 26, 1901.

NO MODEL.

2 SHEETS—SHEET 1.

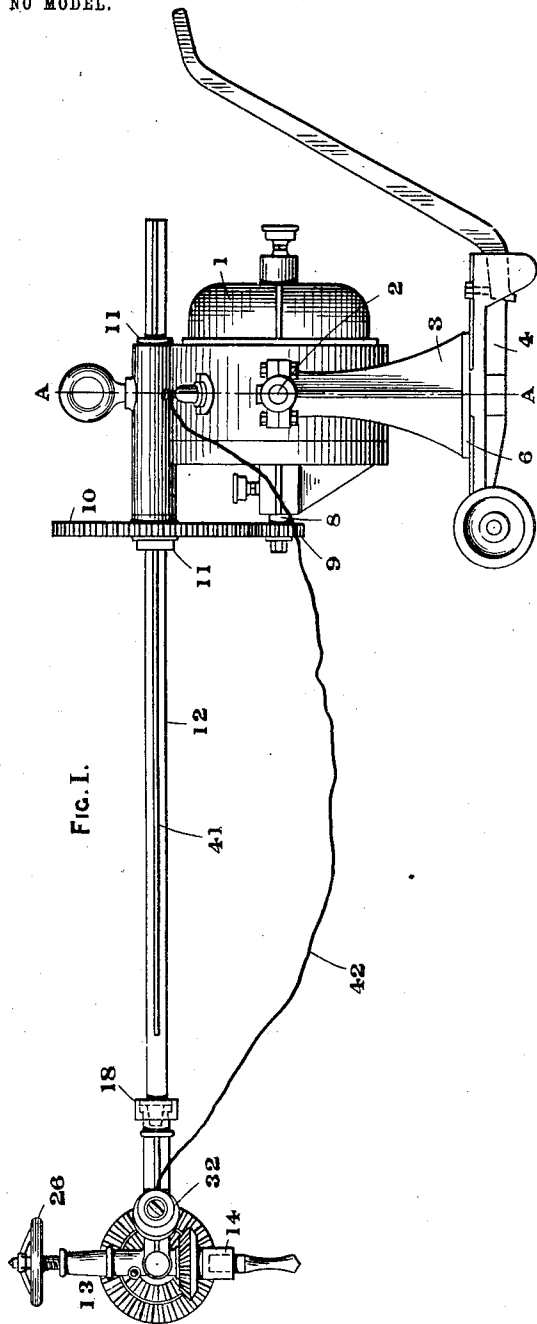


FIG. I.

Attest:  
*Amos L. Reed*  
Edw. L. Reed

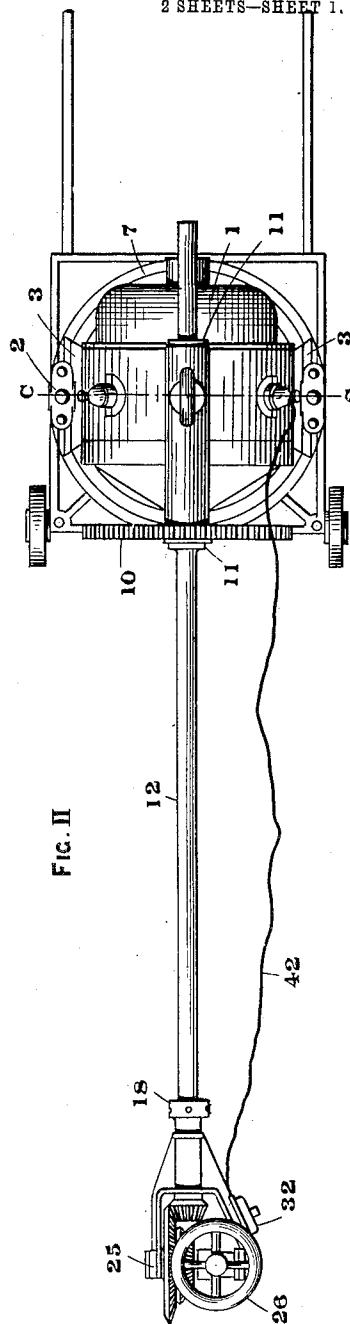


FIG. II

Inventors:  
George F. Campbell  
Stanley T. Isherwood.

By *Wm. L. Reed*  
Att'y.

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2 SHEETS—SHEET 2.

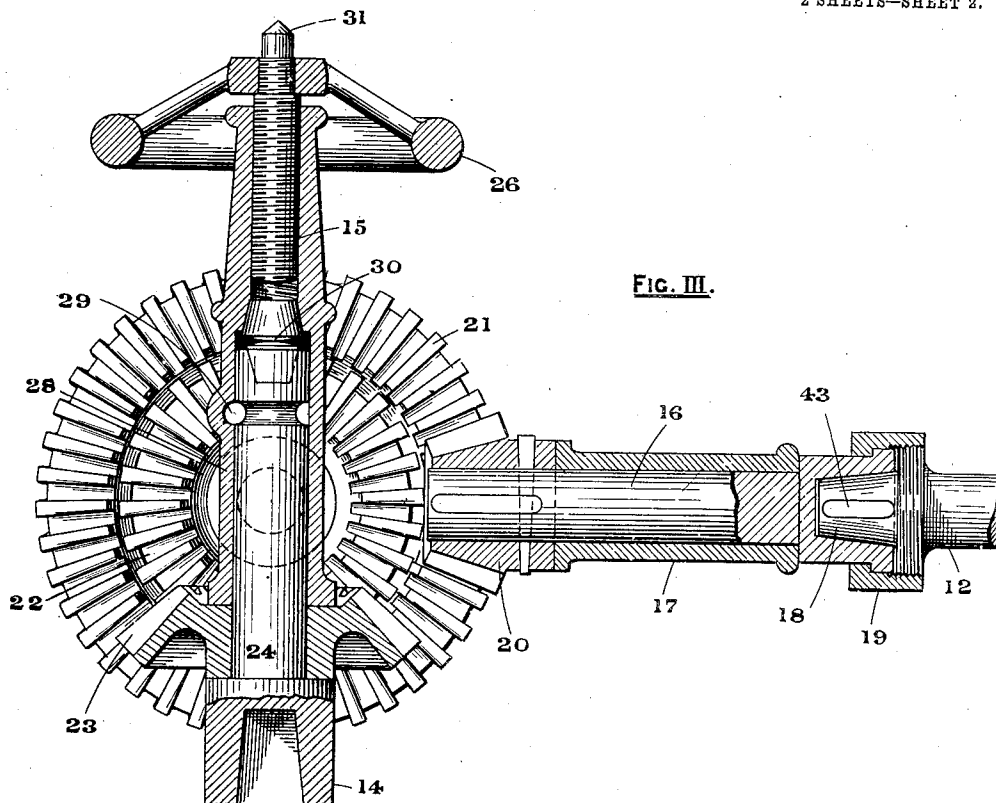


FIG. III.

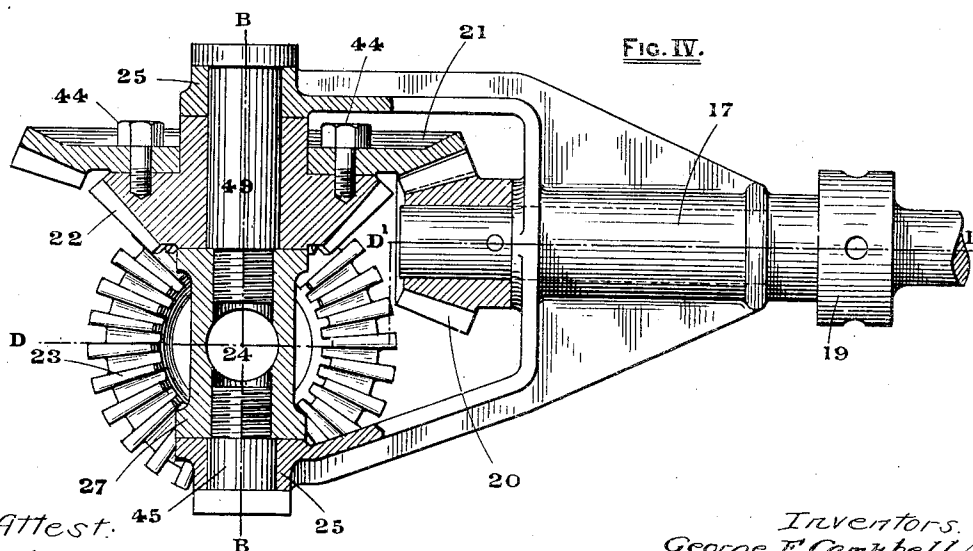


FIG. IV.

Attest:  
Commissioner  
Edw. L. Reed

Inventors:  
George F. Campbell  
Stanley T. Isherwood.  
by *Wm. L. Reed*  
Att'y.

# UNITED STATES PATENT OFFICE.

GEORGE FREDERICK CAMPBELL AND STANLEY THOMAS ISHERWOOD, OF  
BOOTLE, NEAR LIVERPOOL, ENGLAND.

## PORTABLE ELECTRICALLY-DRIVEN DRILLING APPARATUS.

**SPECIFICATION** forming part of Letters Patent No. 749,841, dated January 19, 1904.

Application filed November 26, 1901. Serial No. 83,721. (No model.)

*To all whom it may concern:*

Be it known that we, GEORGE FREDERICK CAMPBELL and STANLEY THOMAS ISHERWOOD, subjects of the King of Great Britain, residing in Bootle, near Liverpool, in the county of Lancaster, England, have invented certain new and useful Improvements in Portable Electrically-Driven Drilling Apparatus, of which the following is a specification.

We will describe our present invention with reference to the accompanying drawings, in which—

Figure I is an elevation of the general arrangement of one form of our apparatus. Fig. II is a plan of Fig. I. Fig. III is a sectional elevation on line D D' of Fig. IV of an enlarged detail view of the drill-head and short extension-shaft. Fig. IV is a sectional plan of Fig. III.

Throughout the drawings similar parts are indicated by the same reference characters.

We mount the motor 1 on two horizontal trunnion-bearings 2, carried in a bracket 3, adapted to pivot relatively to the truck 4, about a vertical axis A A, the base 6 of the bracket being steadied on the truck by means of a circular race 7, upon which it rides. Where the motor is to be slung, the trunnions are carried in an encircling bow and form the horizontal axis, the supporting chain or rope providing for the movement about the vertical axis.

In the particular form of drill we are now describing the speed reduction from the motor-shaft 8 to the drill-head is effected in the following manner: On one end of the motor-shaft 8 we fix a pinion 9, which gears into a spur-wheel 10, mounted on a hollow shaft 11, preferably carried on the casing of the motor 1. A length of shafting 12, keywayed at 41 for the greater portion of its length, is adapted to move axially through the hollow shaft 11, the latter being provided with a fixed key which slides in the keyway 41 of the shaft 12 and by means of which the hollow shaft drives the sliding shaft. The drill-head 13 comprises the usual drill-socket 14 and feeding-screw 15, provided with a hand-wheel 49 for regulating the feed. A short length of shaft 16, sheathed

in the tube 17, forming part of the frame of the head, is adapted to form an extension of the shaft 12 and be secured to it by means of the coupling 18.

The respective ends of the sliding shaft 12 and short shaft 16 are coned male and female, and the coned end of the shaft 12 is also provided with a feather 43, the two coned parts being forced into frictional contact and the feather 43 held in its keyway by the nut 19. Secured to the other end of the shaft 16 is a bevel-pinion 20, gearing into the large bevel-wheel 21, which is in turn attached by set-screws 44 to one of a pair of miter-wheels, 22, the other, 23, being secured to the drill-socket spindle 24. The frame of the head is branched from the tube 17 to form two bearings 25 25, carrying two studs 49 and 45, which screw into the cross-piece 27 and allow of the drill being almost completely rotated about their common axis B B, the stud 49 also forming a spindle upon which the coupled wheels 21 22 rotate. The cross-piece 27 is made integral with the spindle-socket 28. A set-pin engaging in a groove 29, turned in the spindle 24, retains the latter in place. It will thus be seen that the rotation of the motor-shaft 8 is conveyed to the drill-socket 14 through the pinion 9 and spur-wheel 10, the hollow shaft 11, sliding shaft 12, and extension-shaft 16, bevel-wheels 20 21, and miter-wheels 22 23.

The end thrust of the drill-spindle is taken on two convex surfaces 30, of hardened steel, on the drilling center line instead of on a collar, as in the usual arrangement. The necessary abutment for the feed-screw is provided at 31, and a controlling-switch 32 is mounted on the drill-head and connected up to the motor through leads 42. It will be seen that this form of apparatus admits of five distinct motions. The motor as a whole may be rotated on the trunnions 2 about the horizontal axis C C and on the circular race 7 about the vertical axis A A. The shaft 12 is capable of sliding axially through the hollow shaft 11, and the drill may be rotated about the axis D' D' and partially about the axis B B. The axes about which the motor and the drill-head may rotate being in each case in planes at

right angles to each other give in combination with the sliding motion of the shaft 12 a very considerable range of adjustment.

Having now fully described our invention,  
5 what we claim, and desire to secure by Letters Patent, is—

In combination with a shaft 12, a frame swiveled on the end of this shaft, studs 49 and 45 extending from said frame inwardly to-  
10 ward each other and screw-threaded at their inner ends, a spindle-socket having a cross-piece into which the inner ends of the studs are screwed, a spindle carried by the spindle-

socket, a gear on the said spindle, a gear turning loosely on the plain part of stud 49 15 and a gear connection therefrom to the shaft 12, substantially as described.

In testimony whereof we have hereunto set our hands in the presence of two subscribing witnesses.

GEORGE FREDERICK CAMPBELL.  
STANLEY THOMAS ISHERWOOD.

Witnesses:

J. E. LLOYD BARNES,  
J. E. HIRST.