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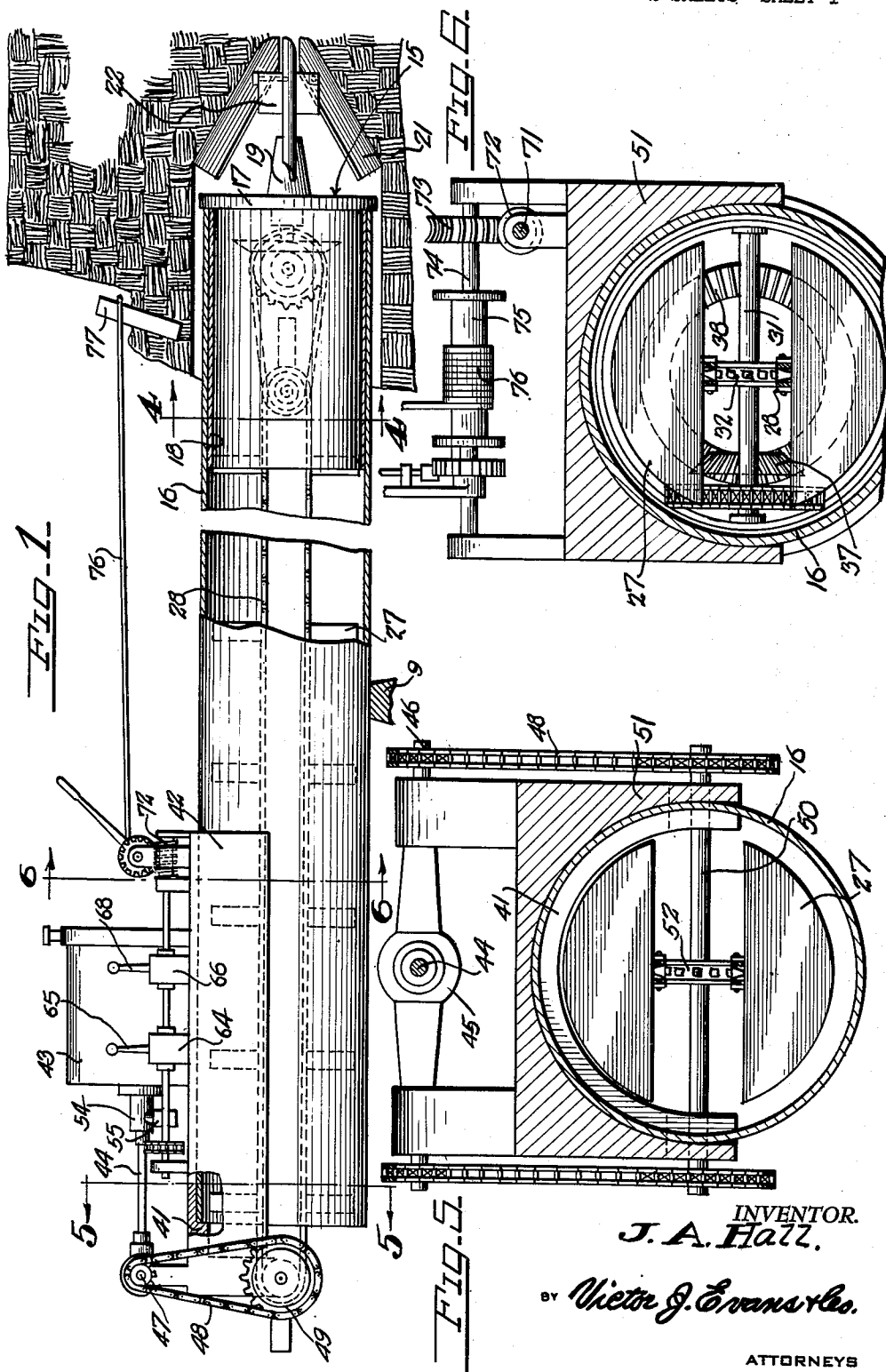
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2,625,375

HORIZONTAL ROTARY DRILL

Filed May 7, 1948

2 SHEETS—SHEET 1



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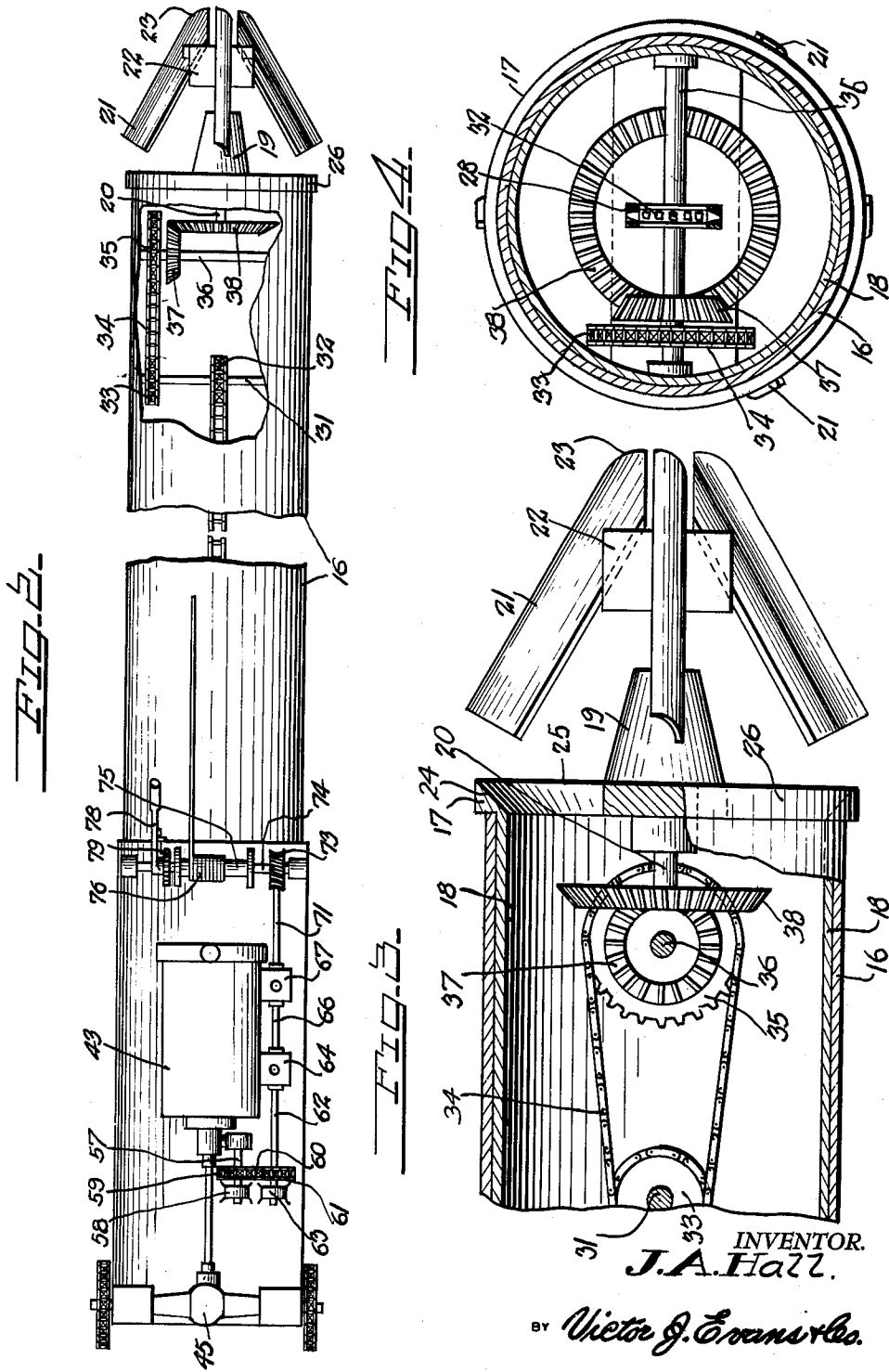
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2 SHEETS—SHEET 2



UNITED STATES PATENT OFFICE

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HORIZONTAL ROTARY DRILL

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2 Claims. (Cl. 255—20)

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This invention relates to a rotary earth drill for boring under railroads and highways for the insertion of pipe lines.

It is an object of the present invention to provide a rotary earth drill which may propel itself through the earth as the drilling is effected and wherein provision is made for the conduit to follow the drill and reinforce the opening prepared by the drill and thereby to eliminate costly repair which may result from the holes being caved inwardly.

Other objects of the present invention are to provide an earth drilling machine of a type adapted to extend the pipe into the hole as the drilling is effected which is of simple construction, easy to set up, inexpensive to manufacture and efficient in operation.

For other objects and for a better understanding of the invention, reference may be had to the following detailed description taken in connection with the accompanying drawing, in which

Fig. 1 is a side elevational view of the drill in operation with portions broken away to show the interior construction.

Fig. 2 is a top plan view of the earth drill with portions broken away.

Fig. 3 is an enlarged side elevational view of the drill head with portions broken away and shown in section and showing the drive mechanism therefor.

Figs. 4, 5 and 6 are respectively enlarged sectional views taken at different stations along the drill and respectively upon lines 4—4, 5—5 and 6—6 of Fig. 1 and looking in the direction of the arrows thereof.

Referring now to the figures, 15 represents generally a drill head onto which the leading end of a pipe or conduit 16 is extended and used for supporting the drill head as it advances through the earth. The pipe or conduit 16 provides a lining such as a well casing for preventing cave-ins and through which pipe lines may be installed. The conduit is supported at the drill bit end by the drill-head in the earth and the outer end which will project from the bank or opening is supported by shoring 9 or the like which also prevents the conduit turning with the drill bit. The drill head 15 has a plate 17 upon its front end from which there extends rearwardly a sleeve 18. In the plate or flange 17 is a large bearing 19 through which a drill shaft 20 extends for supporting cutter blades 21 which are arranged on an enlargement 22 on the shaft 20, circumferentially spaced thereabout and in-

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clined radially and rearwardly. The forward ends of the cutter blades 21 are rounded as indicated at 23.

The plate 17 is beveled as indicated at 24 to provide a sharp edge 25 for gathering the earth material which has been loosened. Openings 26 are provided in the plate portion 17 through which the dirt will be extended into the sleeve portion 18 to be picked up by conveyor elements or flights 27 on a conveyor chain 28. This conveyor chain 28 also serves to power the shaft 20 and the cutter blades 21.

In the sleeve portion 18 is a transverse drive shaft 31 having a sprocket 32 on which the chain 28 is positioned to drive the same. Also on the shaft 31 which forms the tailshaft of the conveyor is a sprocket 33 which drives a chain 34 connected to a transverse sprocket 35 on another transversely extending shaft 36 which has a bevel gear 37 for connection with a bevel gear 38 of shaft 20.

Loose earth will be conveyed rearwardly through the part 16 and discharged from its rear end. Mounted on the top of the pipe 16 and having a flange 41 projected over its rear edge as shown in Fig. 1 is a curved base 42 that nests snugly on the pipe and supports a power plant 43 which drives a shaft 44 connected to a gear housing 45 having a transverse drive shaft 46 with sprockets 47 on the ends thereof. The base 42 with the power plant thereon is secured in position on the conduit by the weight of the base and power plant. Each sprocket 47 is connected by a chain 48 with a large sprocket 49 on a head shaft 50 journaled in depending bearings 51 on the base 42 and having a sprocket 52 on which the conveyor chain 28 is positioned to drive the same.

Extending from a housing 54 through which the shaft 44 extends, is a power takeoff device 55 from which a shaft 57 that is journaled in a bearing 58 on the base 42 extends. This shaft 57 has a sprocket 59 which is connected through a chain 60 with a sprocket 61 on a shaft 62 journaled at one end in a bearing 63 and connected to a multiple speed transmission 64 having a gear shift lever 65. This transmission 64 is connected through a shaft 66 to a second transmission which multiplies the number of speed reductions, as indicated by the numeral 67 and which has a gear shift lever 68. This second transmission has an outward shaft 71 with a worm 72 thereon adapted to drive a worm wheel 73 on a winch shaft 74 having a drum 75 with a cable 76 extended thereover. The cable 76 ex-

tends to a dead man post 77 fixed in the earth above the location where the opening is to be extended therethrough. A hand lever 78 with a detent device 79 thereon control the operation of the winch. Once the winch has been set in operation and the gear levers 65 and 68 of the transmission are properly adjusted, the feeding of the drill head will be automatic and the pipe 16 will follow through with the drill head and extend the same into the opening being formed. When the pipe has been finally extended through the opening and the head has penetrated the opposite side of the highway, the power plant can be removed from the pipe 16 and upon disconnecting the chain 28, the head with the driving chain 34 can be pulled through the forward end of the conduit and removed therefrom. The conduit 16 will be left in place to serve as a culvert, and a pipe line may be extended there-through.

While various changes may be made in the detail construction, it shall be understood that such changes shall be within the spirit and scope of the present invention as defined by the appended claims.

I claim:

1. A horizontal boring tool comprising a conduit, a power plant base with an arcuate recess in the under surface nested upon the upper surface of the conduit, said base having a projection positioned to engage the end of the conduit for forcing the conduit to travel with the base, a drill head positioned in the opposite end of the conduit, a longitudinally disposed drill shaft journaled in the said drill head, digging blades positioned substantially in a conical shape carried by the outer end of the drill shaft, a conveyor having flights thereon mounted in the conduit and positioned with the flights in scraping relation with the inner lower surface of the conduit, means driving the conveyor from the power plant mounted on a base on the conduit, means rotating the drill shaft journaled in the drill head by the conveyor, a drum having a cable thereon journaled on the base of the power plant whereby with an extended end of the cable anchored in the ground the power plant, conduit and drill head may be drawn toward the point where the cable is anchored, and means rotating the drum from the said power plant.

2. In a horizontal boring tool, the combination which comprises an elongated tubular casing, a power plant mounted on a base having a substantially semi-circular recess in the lower surface and secured in position on the tubular casing by its weight with one end of the casing nested in the said recess, a flange having a tubular section with bearings extended therefrom providing a drill head and positioned in the end of the casing opposite to that on which the power plant and base are mounted, a drill shaft journaled in the bearings of said flange, positioned longitudinally of the casing and aligned with the center thereof, digging elements carried by the outer end of the drill shaft, a bevel gear positioned on the inner end of the drill shaft, a transversely disposed shaft journaled in the said drill head, a bevel gear on the said transversely positioned shaft meshing with the bevel gear of the longitudinally disposed shaft, a conveyor having a head shaft journaled in bearings suspended from the power plant and a tail shaft journaled in the drill head, said conveyor positioned to extend substantially throughout the length of the tubular casing, means rotating the said transversely disposed shaft of the drill head by the tail shaft of the conveyor, means driving the conveyor from the power plant, and a windlass having a cable thereon positioned on the base of the power plant and driven by said power plant whereby with an extended end of the cable anchored to the tubular casing, power plant and drill head are drawn toward the point where the cable is anchored as the windlass is actuated to wrap the cable therein.

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