

May 31, 1932.

E. D. WATT

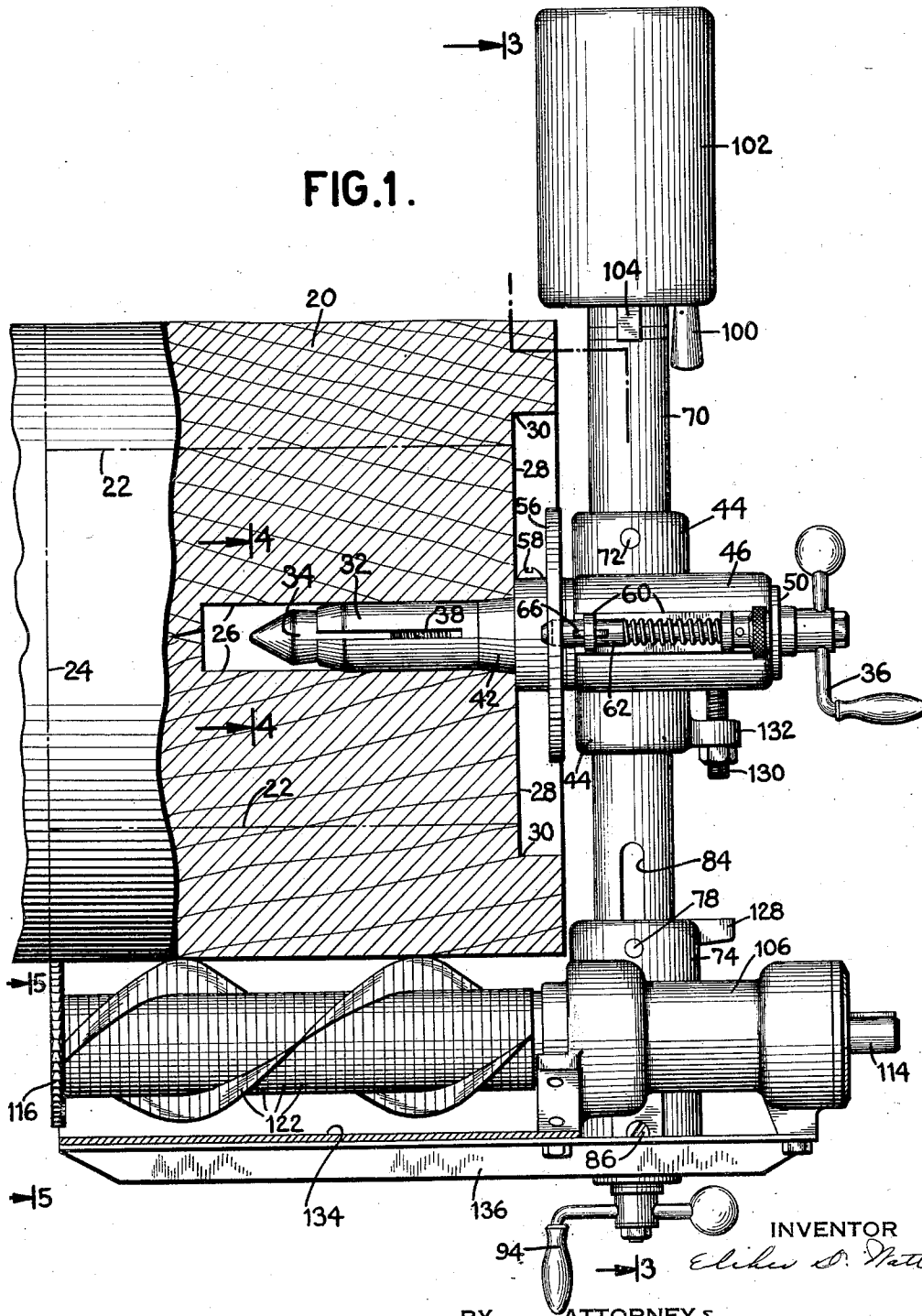
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PILE TENON TURNING MACHINE

Filed June 8, 1931

6 Sheets-Sheet 1

FIG. 1.



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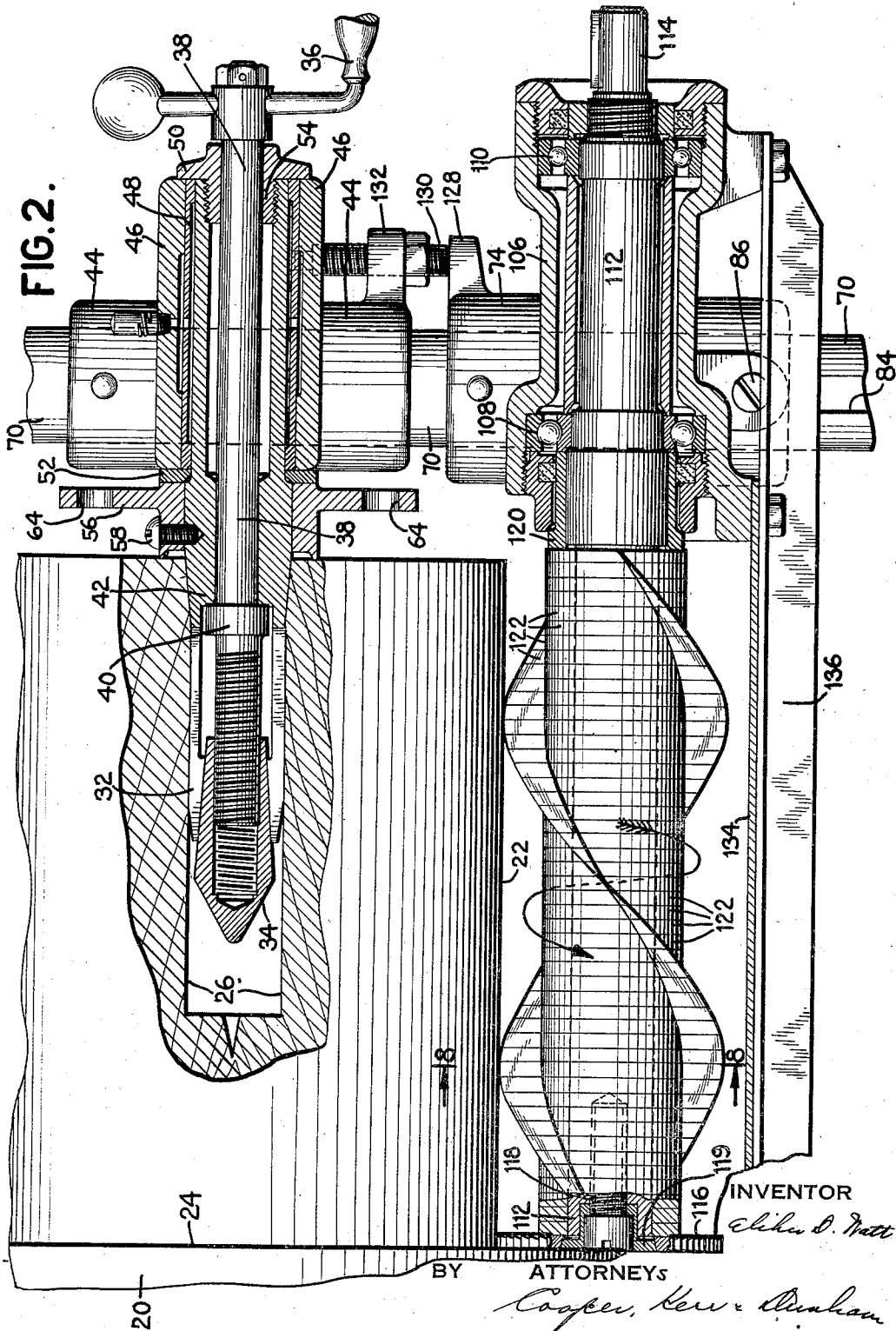
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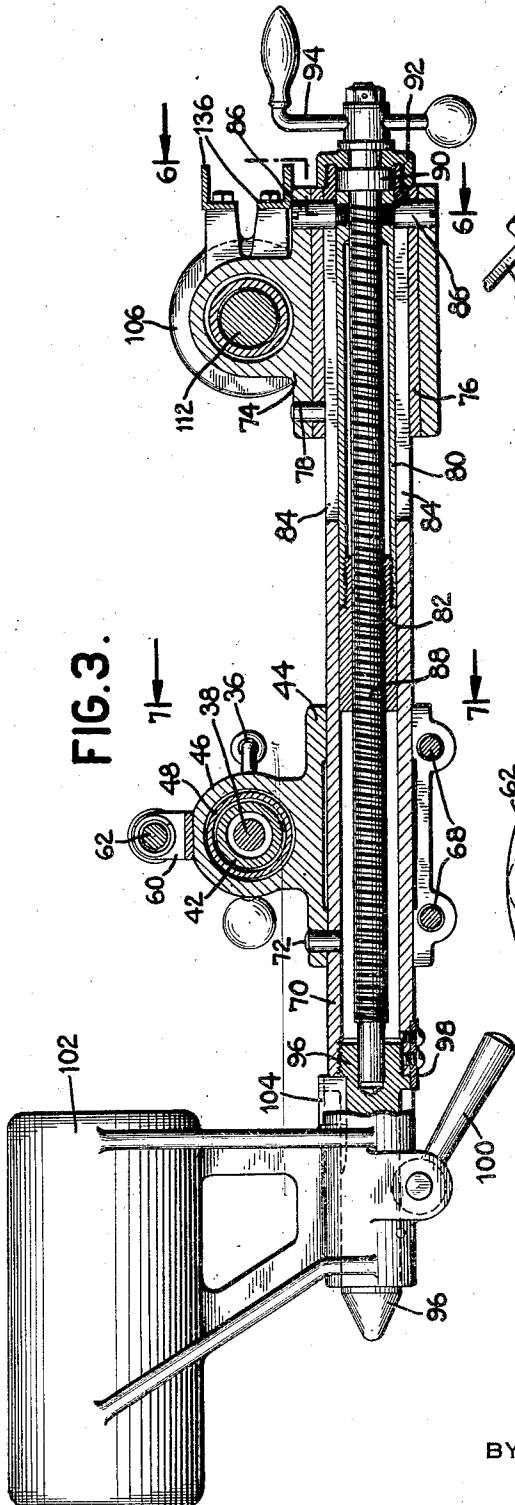


FIG. 3.

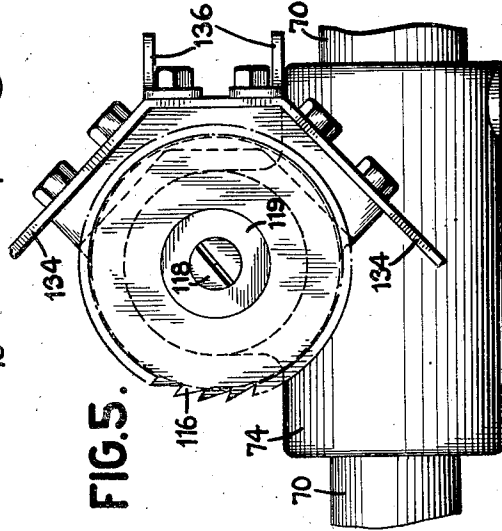


FIG. 5.

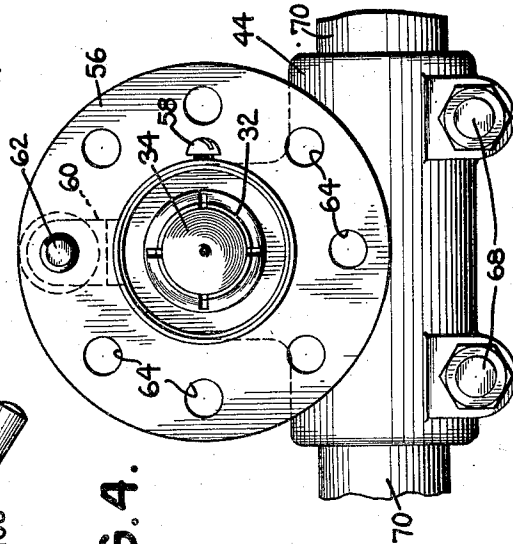


FIG. 4.

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FIG. 7.

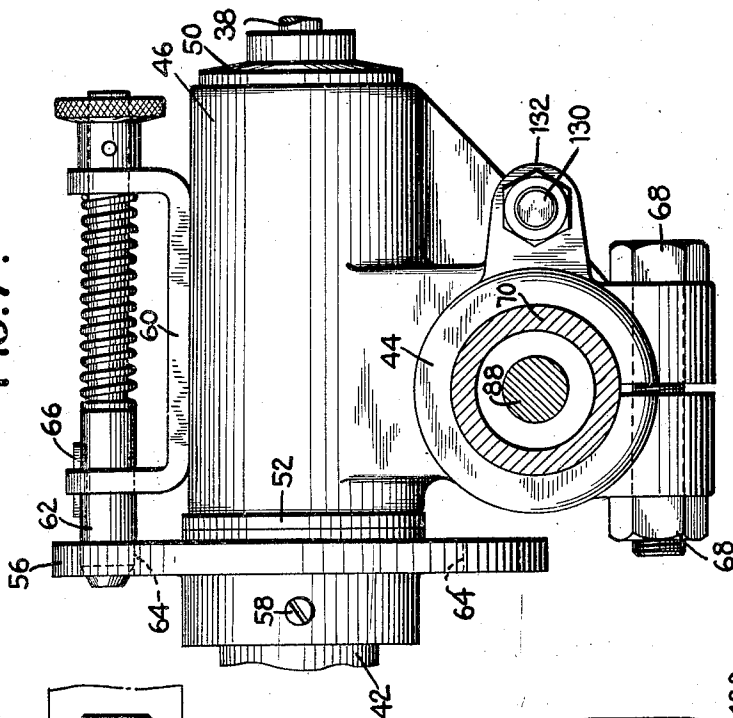


FIG. 6.

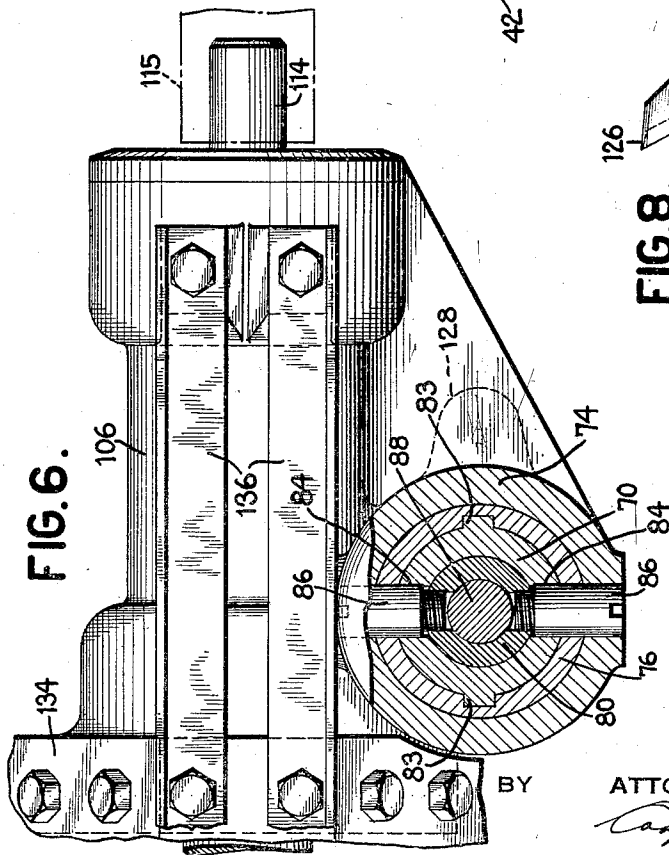


FIG. 8.

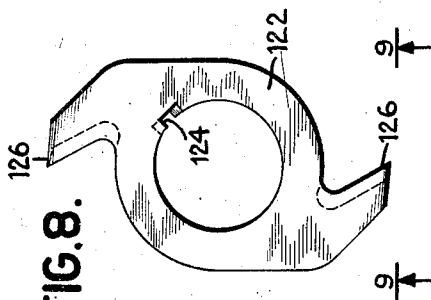


FIG. 9.



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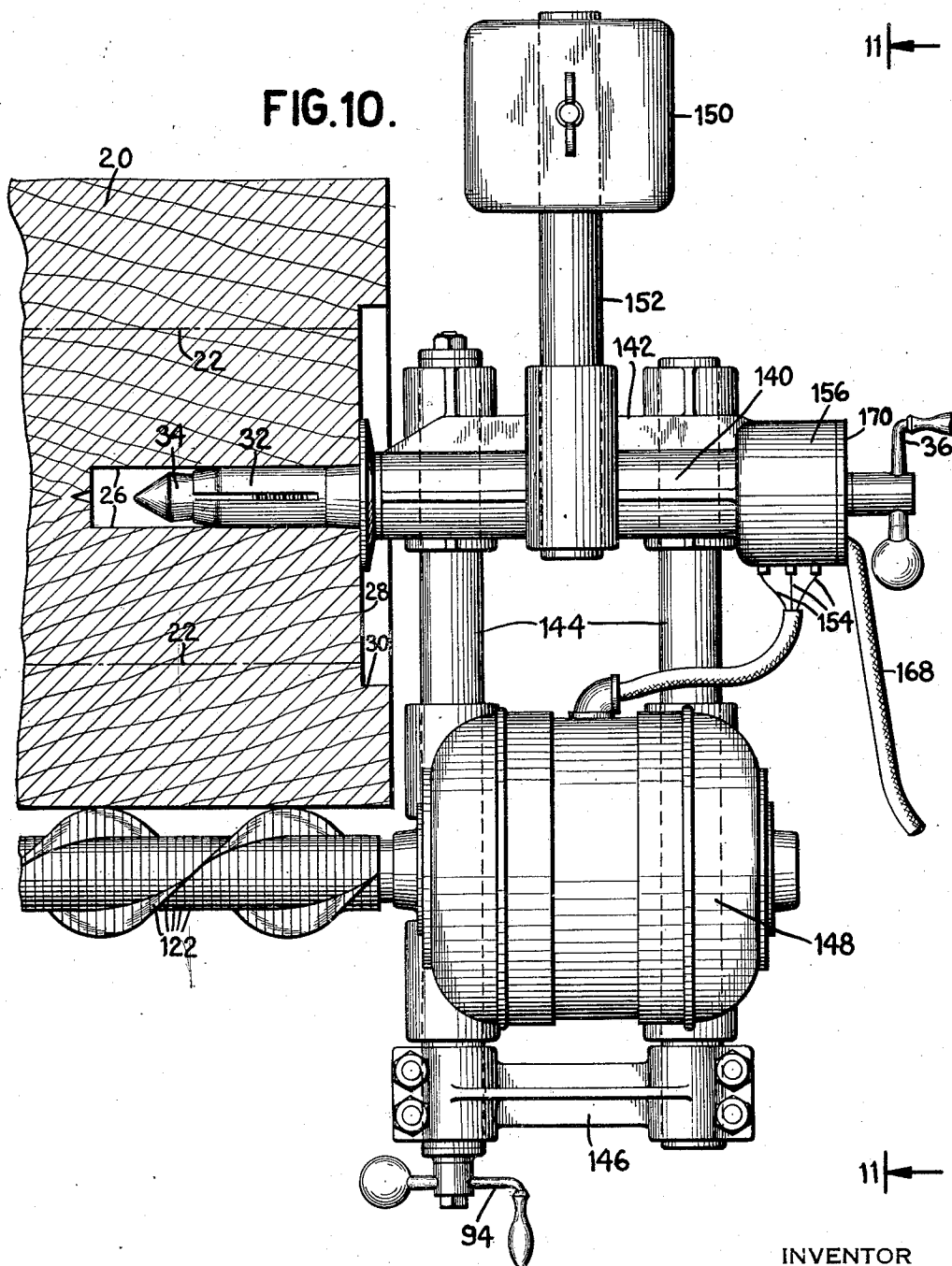
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FIG. 10.



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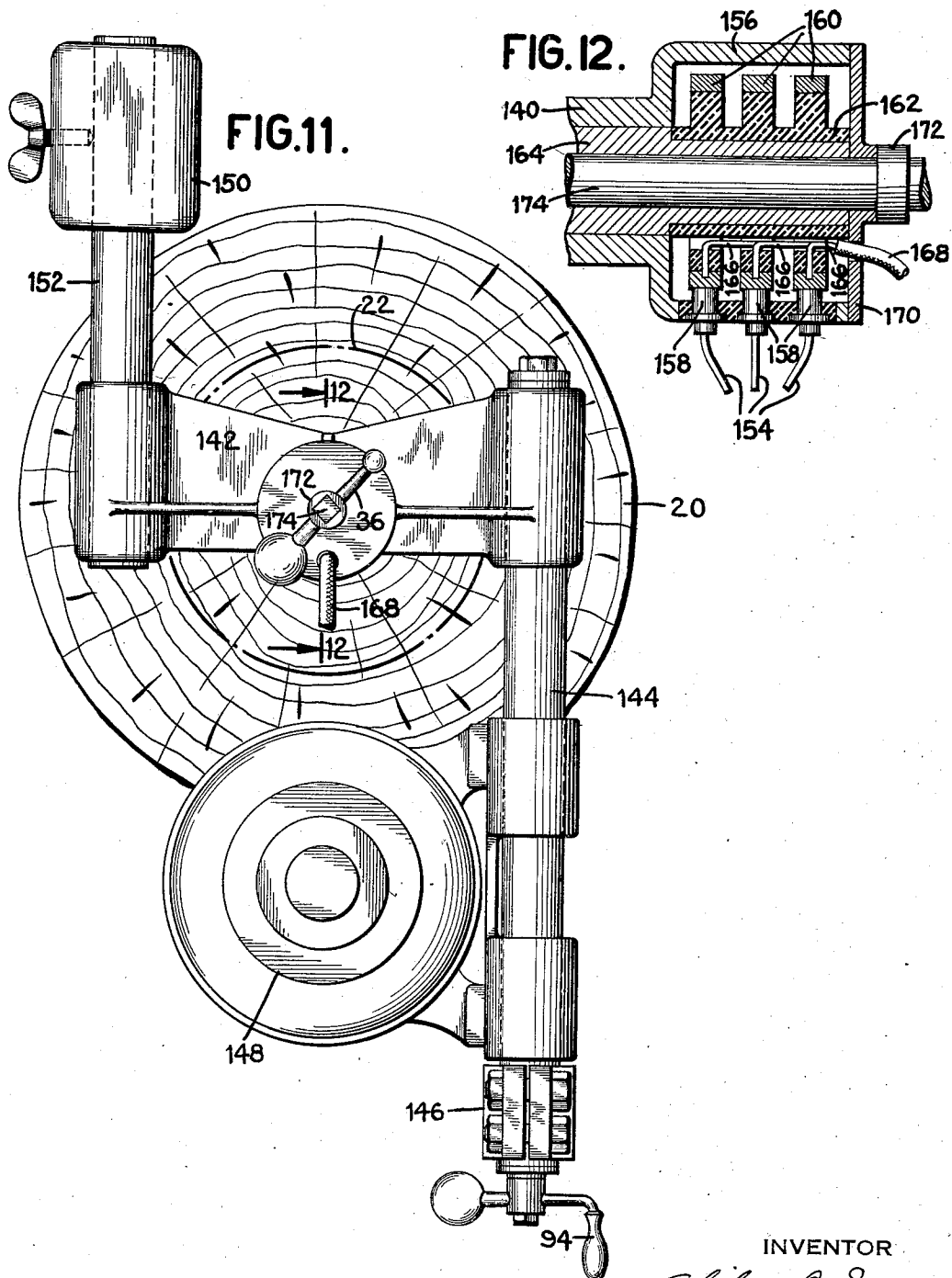
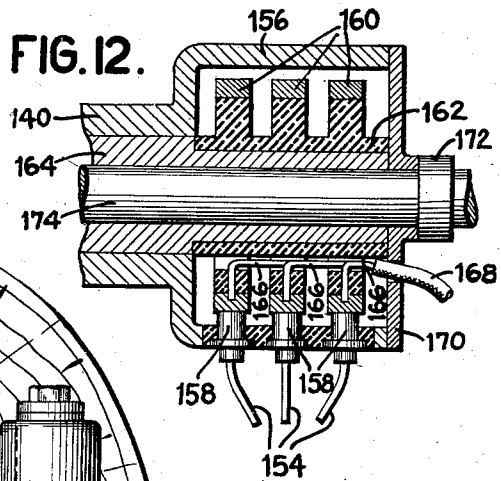
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PILE TENON TURNING MACHINE

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6 Sheets-Sheet 6



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UNITED STATES PATENT OFFICE

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PILE TENON TURNING MACHINE

Application filed June 8, 1931. Serial No. 542,725.

This invention pertains to the turning of tenons on wooden piles to adapt them for use as the lower sections of composite piles.

Heretofore the forming of the tenons has been done by hand or by large lathes of the type shown in Upson Patent 1,551,915 issued September 1, 1925. The hand method gives inaccurate results, and the use of the large lathe is too expensive, especially on small jobs. The lathe is high in first cost and requires from 50 to 75 horse power to drive it. The machine is very heavy, costly to transport and set up, and even after it is installed on the job the cost of handling the piles is high because they must first be delivered to the lathe and then hauled to the driver.

The machine herein disclosed is light in weight, therefore portable, and requires only 2 to 3 horse power for its operation. It is attached temporarily to the pile on which it is to operate, does its work quickly and cheaply, and since it may be used wherever the piles happen to be, no special handling of the piles is required.

The tenon forming operation is preferably divided into two steps each performed by a special portable machine. One machine drills a hole in the center of the head of the pile and faces the head at right angles to the hole. Then the present machine is placed in position and performs the operation of turning the tenon to proper length and diameter. The hole bored by the first machine is used to clamp the present machine in operative position.

Two forms of the machine are illustrated in the drawings in which:

Fig. 1 shows a machine in operative position, on the head of a pile, ready to begin operations.

Fig. 2 is a view similar to Fig. 1, except partly in cross-section, and showing the turning operation complete.

Fig. 3 is a view on line 3—3 of Fig. 1.

Fig. 4 is a view on line 4—4 of Fig. 1.

Fig. 5 is a view on line 5—5 of Fig. 1.

Fig. 6 is a view on line 6—6 of Fig. 3.

Fig. 7 is a view on line 7—7 of Fig. 3.

Fig. 8 is a view of a cutter unit on line 8—8 of Fig. 2.

Fig. 9 is a view on line 9—9 of Fig. 8.

Fig. 10 is a view of a modified machine in which a direct connected motor is used for driving the cutter.

Fig. 11 is a view on line 11—11 of Fig. 10.

Fig. 12 is a view on line 12—12 of Fig. 11.

Referring to Fig. 1, 20 designates the head of a pile on which it is desired to turn a tenon of a diameter indicated by broken lines 22, having an annular shoulder on the pile, as indicated by broken line 24. That is to say, the machine is designed to remove the material above and outside of surfaces 24 and 22 respectively. The term "above" means towards the head of the pile. Hole 26 has already been bored axially in the center of the pile and the head has been faced off on surface 28 to a point 30, beyond surface 22.

To attach the machine to the pile, split chuck 32 (Figs. 1 and 2) is expanded tightly against the wall of hole 26 by means of cone 34, drawn upwardly by crank 36, through the instrumentality of rod 38 threaded into the cone. Rod 38 has an integral collar 40 adapted to thrust against the body 42 of the chuck.

Mounted on chuck body 42 is a split member 44 having a hub 46 lined with a bushing 48 and adapted for rotation around body 42. Hub 46 and bushing 48 are restricted in endwise movement by flange 50 and collar 52. Flange 50 is integral with plug 54 which is screwed into the open end of body 42 to serve as a bearing for shaft 38. Ring 52 bears against the hub of collar 56 which is secured to body 42 by screw 58. Attached to hub 46 is a bracket 60 (Figs. 1, 4 and 7) supporting a spring pressed plunger 62, which may be inserted into a hole 64 in collar 56 in order to prevent inadvertent rotation of hub 46. Normally, however, plunger 62 is retracted and rotated in bracket 60 in which position it is held inoperative by key 66.

Passing through member 44 and held tightly therein by bolts 68 which pass through the split side of member 44, is a hollow bar 70. Dowel pin 72 prevents rotation of member 44

and bar 70. On one end of bar 70 is slidably mounted a tool holding member 74, provided with a lining 76 to which it is attached by dowel 78. Within tubular bar 70 is a tubular member 80 to the inner end of which is attached the internally threaded nut 82. Keys 83 prevent rotation of lining 76 relatively to tube 80. (Fig. 6.)

Bar 70 has two diametrically opposed longitudinal slots 84, through which snugly pass pins 86, threaded into the end of tube 80 and passing snugly through holes in member 74. Threaded through nut 82 is a rod 88, one end of which passes through the outer end of tube 80 and has a collar 90. Cap 92 threaded into the end of bar 70 and engaged on one side by collar 90 and on the other side by the hub of crank 94 serves to hold rod 88 against lengthwise movement. Rod 88 may be manually rotated by crank 94, thereby moving member 74 longitudinally along bar 70, guided by pins 86 in slots 84.

The other end of rod 88 is supported by a plug 96 screwed into the end of bar 70 and prevented from rotation by key 98 notched into the rim of the nut. Clamped to nut 96 by lever 100 is the counter weight 102 adapted to balance the apparatus on the opposite end of bar 70. A key 104 welded to nut 96 prevents rotation of weight 100 relatively to the bar.

From the above, it will be clear that rotation of crank 94, through the instrumentality of rod 88 and tube 80, will cause member 74 to move along bar 70, guided by studs 86 in slots 84.

Integral with member 74 is a bearing-supporting housing 106 adapted to support ball bearings 108, 110, in which are mounted for rotation a cutter shaft 112 having a projecting end 114 adapted for attachment of a flexible driving shaft 115 of any convenient form. Suitable spacing collars, dust washers, etc., are provided to locate and protect the ball bearings. Shaft 112 extends from housing 106 at right angles to bar 70 and parallel to the axis of the pile. On the free end of shaft 112 is a saw 116 held in position by screw 118 and cone 119. Mounted on shaft 112 between saw 116 and sleeves 120 projecting from housing 106 are closely spaced cutter units 122 (Figs. 8 and 9). They are held from rotation relatively to shaft 112 by keyways 124 adapted to engage a helical key (not shown) on the surface of shaft 112. Each cutter 122 has two diametrically opposed projecting knives 126. This arrangement of the cutters provides shaft 112 with two helical sets of knives. Saw 116 serves as a collar to clamp cutters 122 lengthwise of shaft 112 against sleeve 120. It has been found that this arrangement of cutter knives removes the wood of the pile rapidly, with slight expenditure of power.

In operation, the apparatus is first assem-

bled as in Fig. 1, with member 74 withdrawn outwardly on bar 70 so that saw 116 and cutters 122 are out of contact with the pile. Then power is applied by means of the flexible shaft, applied at 114, to rapidly rotate shaft 112 and cutters 122. Then bar 70 and all the mechanism supported thereby is manually rotated about chuck body 42. While it is rotating, crank 94 is manually actuated to feed member 74 and cutters 122 inwardly so that saw 116 cuts into the pile to form surface 24, while cutters 122 remove the wood between the saw and the end of the pile until surface 22 is formed, thus completing the formation of the cylindrical tenon (Fig. 2). When the proper diameter is reached, ear 128 on member 74 contacts with stop screw 130 adjustable in ear 132 on hub 44.

To protect the operator from the cutter, a steel shield 134, reinforced by angle bars 136 is fastened to housing 106 and partially surrounds cutters 122 and saw 116.

Figs. 10, 11 and 12 show a modified form of the invention in which hub 46 is replaced by hub 140 upon which is mounted a yoke 142 from which projects a pair of bars 144 clamped together at their free ends by a yoke 146. These bars serve as a cross-head to carry a motor 148 having an extended shaft upon which are mounted cutters 122. The motor is slidable lengthwise of the cross-head bars by means of a crank 94 through the instrumentality of a mechanism not shown in these figures but similar to that already described in connection with the first embodiment of the invention. A counter balance weight 150 is carried on a bar 152 projecting from yoke 142 in a substantially diametrically opposite direction from cross-head bars 144. Current is supplied to the motor through wires 154 extending into commutator housing 156 which comprises an enlargement of the outer end of hub 140. Within the housing 156 wires 154 terminate in brushes 158 which bear on contact rings 160 supported on an insulating hub 162 mounted on chuck body 164 which corresponds in this embodiment to chuck body 42 of the modification first described. From each ring 160 a wire 166 corresponding to each of the wires 158 leads through a conduit 168 to the source of current supply. The end of housing 156 is closed by plate 170 retained in position by the hub 172 of crank 36. In this embodiment rod 38 is replaced by rod 174 upon the outer end of which hub 172 is mounted.

The operation of the modified machine just described is exactly the same as the operation of the first embodiment, the only difference being that the power is supplied to the cutters by a direct connected motor instead of by a flexible shaft. As the device revolves about chuck body 164, rings 160 remain stationary while brushes 158 travel with

body 164, thus maintaining proper electrical connection between the motor and the source of current supply.

It is to be understood that the invention is not limited to the specific embodiment herein illustrated and described, but may be used in other ways without departure from its spirit as defined by the following claims.

I claim:

7. The invention set forth in claim 4 in which said cutter comprises a plurality of sections, each having a knife edge, said sections being so positioned that each knife is circumferentially offset relatively to the knives on each side of it.

In testimony whereof I hereto affix my signature.

ELIHU D. WATT.

1. Apparatus for turning a tenon on the head of a pile having an axial hole therein, comprising in combination, a member insertable in said hole, a bar supported on said member and extending across the head of the pile and rotatable about said member, a rotary cutting tool supported by said bar at the side of said pile head, means for operating said tool, and means for feeding said tool towards the center of said pile whereby said tool removes wood from said pile until a tenon is formed thereon.

2. Apparatus for turning a tenon on the head of a pile having an axial hole therein, comprising in combination, a member insertable in said hole, a bar supported on said member and extending across the head of the pile and rotatable about said member, a rotary cutting tool of substantially the length of the tenon to be formed, and supported by said bar at the side of said pile head, means for rotating said tool, and means for feeding said tool towards the center of the pile, whereby said tool in a single operation removes wood from said pile until a tenon is formed thereon.

3. Apparatus for turning a tenon on the head of a pile having an axial hole therein, comprising in combination, a member insertable in said hole, a bar supported on said member and extending across the head of the pile and rotatable about said member, a motor supported by said bar and having a shaft extending along the side of the pile head, a cutting device mounted on said shaft, and means for feeding said motor towards the center of said pile whereby rotation of said motor will cause said tool to remove wood from said pile to form a tenon thereon.

4. Apparatus for turning a tenon on the head of a pile, comprising in combination, a cutter comprising a shaft, a saw on the end of said shaft, and a plurality of knives closely spaced along said shaft; means for supporting said cutter for rotation about said pile; means for rotating said cutter; and means for feeding said cutter towards the pile whereby said cutter is effective to remove wood from said pile to form a tenon thereon.

5. The invention set forth in claim 4 in which said knives are arranged helically on said cutter.

6. The invention set forth in claim 4 in which said knives are arranged in two helical rows on said cutter.

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