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C. L. BELTZ.

EARTH BORING MACHINE.

APPLICATION FILED FEB. 19, 1908.

Patented Jan. 19, 1909.

2 SHEETS—SHEET 1.

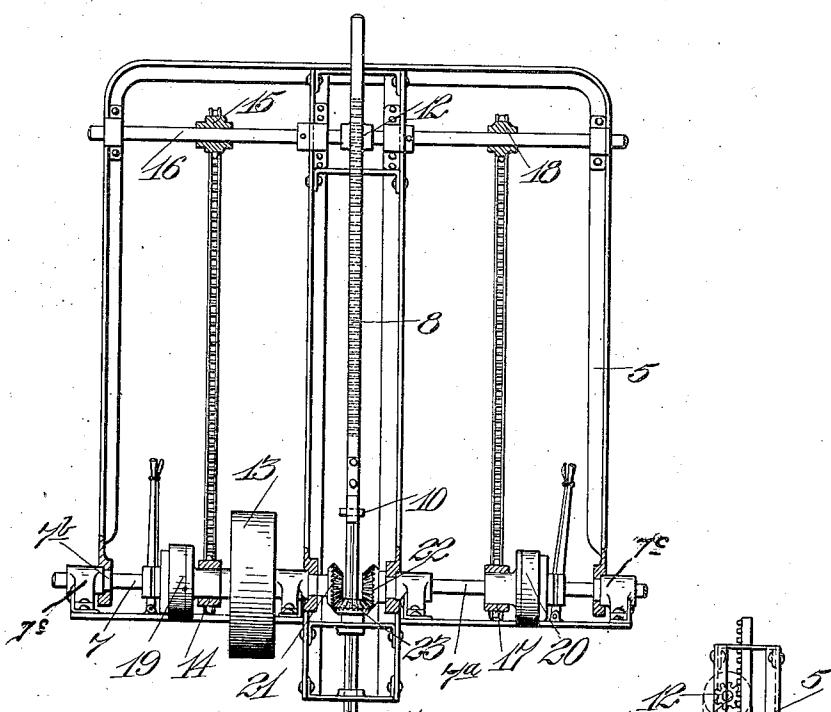
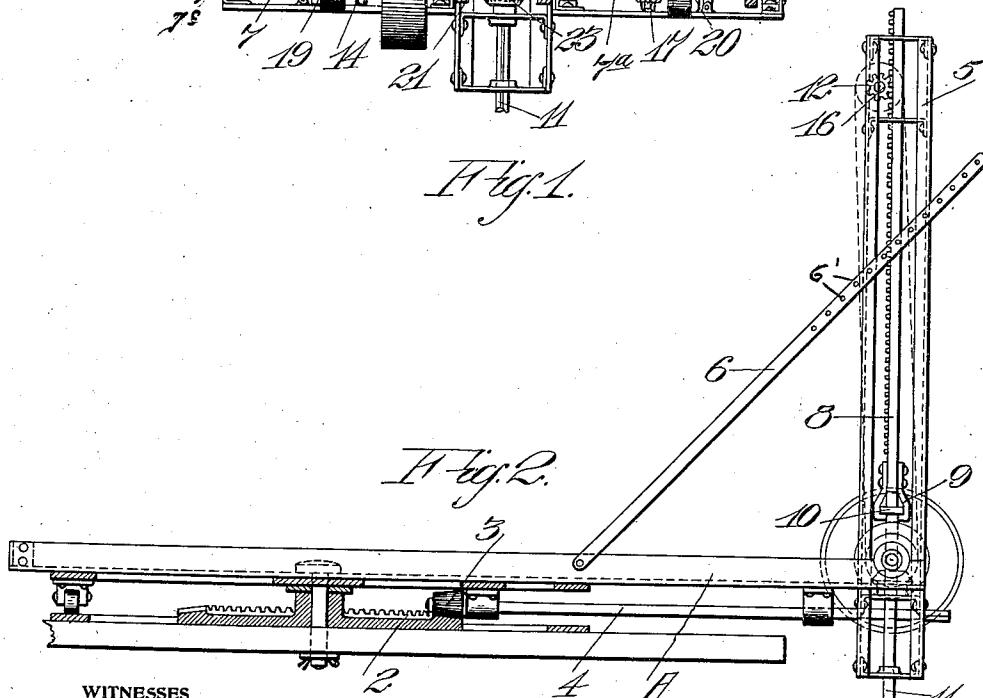


Fig. 1.



WITNESSES

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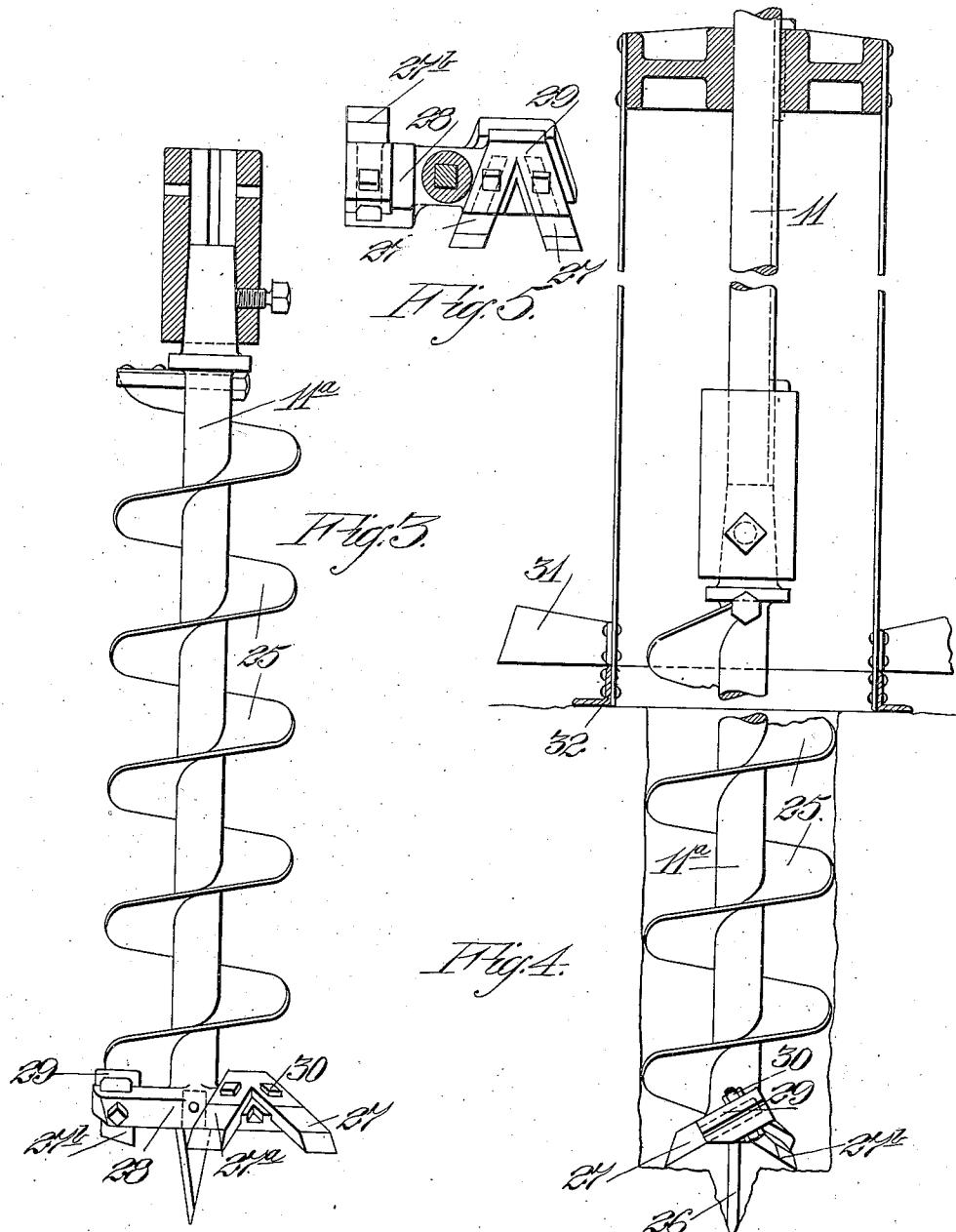
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**WITNESSES**

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# UNITED STATES PATENT OFFICE.

CHARLES L. BELTZ, OF SELMA, CALIFORNIA.

## EARTH-BORING MACHINE.

No. 910,451.

Specification of Letters Patent.

Patented Jan. 19, 1909.

Application filed February 19, 1908. Serial No. 416,782.

To all whom it may concern:

Be it known that I, CHARLES L. BELTZ, citizen of the United States, residing at Selma, in the county of Fresno and State of California, have invented new and useful Improvements in Earth-Boring Machines, of which the following is a specification.

My invention relates to an apparatus which is designed for the rapid boring of holes in the ground for the purpose of receiving posts and poles of all kinds which are to be set upright therein, and for other and like purposes.

It consists in the combination of reversible, turnable mechanism, in the construction and operation of cutting bits, mechanism for clearing the earth from around the top of the hole, and in details of construction which will be more fully explained by reference to the accompanying drawings, in which—

Figure 1 is a front elevation of my earth boring machine. Fig. 2 is a side elevation of same. Fig. 3 is a view of the boring-tool. Fig. 4 is another view of the boring tool, showing revoluble scraper in place. Fig. 5 is a cross section of the lower part of the boring tool, showing the position of the bits.

It is the object of my invention to provide a portable apparatus so constructed that holes may be bored vertically in the earth, either upon level or hillside, and with sufficiently powerful bits to cut earth of any degree of hardness, such as is frequently met in climates having long dry seasons; means by which the holes may be accurately spaced, bored, and rapidly cleared of the excavated earth.

I have here shown my apparatus mounted upon a main frame A which may be supported upon any suitable or desired means for transportation. By means of a circular gear 2, a pinion 3 engaging said gear mounted upon the shaft 4, extending to a convenient point with relation to the working apparatus, power may be applied to said shaft by a crank or otherwise to turn the working portion of the apparatus so that it may be brought into position to bore holes at any desired point with relation to the setting of the machine.

Near one end of the apparatus is a vertically disposed frame 5, turnably connected with the main frame A, and by means of diagonal braces 6, with pin-holes 6' adapted to receive suitable pins or other devices for

the purpose. This frame may be turned to stand at any desired angle with relation to the main frame. Thus, if the contour of the land is such that the main frame stands at an inclination upon the surface, the frame 5 may be turned with relation thereto so as to bore a vertical hole.

The turning of the vertical frame may be about the horizontal shafts 7—7<sup>a</sup> through which power is transmitted to operate the boring and other mechanism. The bearings of the turnable frame are in the form of collars 7<sup>b</sup> upon the outside of the boxes 7<sup>c</sup> of the shafts 7—7<sup>a</sup> and the shafts are thus relieved of weight and friction. A vertically guided and movable rack bar 8 has its lower end provided with jaws 9. Between these jaws a collar 10 is freely turnable, but not allowed vertical movement. This collar 10 is fixed to the head of the drill-shaft 11, and by means of the pinion 12 engaging with the rack bar, the boring-shaft and connected mechanism may be raised or depressed. Power to operate the boring shaft is derived through a pulley 13 engaging therewith and through which the power-shaft is slidable upon a feather.

7<sup>a</sup> is a second shaft journaled in line with the shaft 7 and carrying a pinion 22 which also engages a pinion 23 of the boring-shaft. It will be seen that power thus applied will rotate the pinion 21 in one direction, and the pinion 22 in the opposite direction.

19 and 20 are clutches carried respectively upon the shafts 7—7<sup>a</sup>.

14 and 17 are sprocket-pinions, each connected with one member of its clutch, so that when the clutches are disengaged the sprockets remain stationary.

If the clutch 19 is engaged, and the sprocket 14 thus caused to revolve in unison with the revolution of the shaft power will be transmitted through a chain from the sprocket 14 to its companion sprocket 15 on the shaft 16, and will thus revolve the shaft 16, and through the pinion 12 will move the rack bar 8 downwardly, thus feeding the boring tool downward. When the hole has been bored sufficiently deep, and it is desired to reverse the movement and raise the boring tool out of the ground, the clutch 19 is disengaged.

The clutch 20 is thrown into engagement so that the sprocket 17 will be revolved with the shaft 7<sup>a</sup>. As the shaft 7<sup>a</sup> is revolving in the opposite direction from the shaft 7 by

reason of its connection through the bevel-gears 21, 22, 23 it will be manifest that power transmitted from the sprocket 17, the sprocket 18, through an intermediate chain, 5 will act to reverse the revolution of the shaft 16 and pinion 12, and thus lift the boring-tool from the ground; this tool being constantly revolving in one direction.

The shaft 11 through which power is transmitted to the borer is suitably coupled to a shaft 11<sup>a</sup> around which is formed a spiral 25, the exterior diameter of which is substantially that of the hole to be bored. At the lower end of this shaft 11<sup>a</sup> is fitted a suitable bit 15 26 which is herein shown as being in the form of a solid steel head having a suitable shank and means for connecting it with the shaft 11<sup>a</sup>. In transverse section, this steel head is made rectangular or diamond shape, and it 20 terminates in a cutting bit so that when the shaft is revolved and weight applied to it, this point will enter the ground, and its angles will cut away the ground sufficiently to bring the actual boring tool into operation. 25 This boring or excavating tool is composed of cutting bits 27 made of the finest possible steel for the purpose. I have here shown three of these bits mounted upon radial arms or supports 28 formed with the lower 30 part of the shaft 11<sup>a</sup>. The outer end of one of these arms has divergent grooves or channels within which the shanks of two of the bits lie.

29 are channeled pieces having the channels adapted to fit the upper part of the bit shank, and by means of bolts 30 they are firmly secured in place. These bits may be thus adjusted to extend to a greater or less distance outside of their channel supports, 40 and the outer angle of the cutting edge of the outer bit is so placed as to cut away the earth sufficiently to prevent its coming in contact with and wearing the bit support. As the two bits 27—27<sup>a</sup> have their cutting 45 edges separated to a considerable extent, the third bit 27<sup>b</sup> is so located with relation to the first that it will cut away and pulverize the ring of material which might otherwise remain between the outer and inner cutters, 50 and the earth thus loosened will be removed, or partially so, by the action of the spiral blade 25. When the hole has been bored to a sufficient depth, the boring apparatus may be withdrawn by the reversal of the movement of the rack bar 8 as previously described.

In order to prevent the earth which has been excavated from falling back into the hole, when the bit is removed, I have shown 60 a revoluble scraper consisting of wings 31 mounted upon a flange ring 32, and so disposed as to be revoluble about the mouth of the hole. These wings 31 may be made angular, or of a propeller shape and their action will be to throw the dirt outward from

the mouth of the hole, as it is brought up by the spiral and prevent its falling back into the hole when the latter has been finished.

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

1. An earth boring machine having in combination a horizontally-disposed main frame, and a turn-table upon which it is mounted, an upwardly extending guide frame at one end of the main frame, horizontal shafts arranged in line across one end of the main frame, said guide frame having its lower portion turnably mounted upon an axis which is coincident with the axis of the shafts whereby the guide frame may be adjusted to stand at any desired angle with relation to the main frame, means for holding the guide frame in its adjusted position, a boring device guided and movable upon said guide frame, said boring device and the adjacent ends of the horizontally aligned shafts having engageable gears, and mechanism operated from said shafts by which said device is advanced or retracted. 90

2. In an apparatus of the character described, the combination of a main frame, a turn-table therefor, a vertically extending guide frame, horizontally-disposed aligned shafts extending across the main frame, said guide frame having its lower ends turnably mounted on an axis which is coincident with the axis of the shafts whereby it may be turned to stand at any desired angle with relation to the main frame, means for holding the guide frame in its adjusted position, said main frame having boxes for the horizontal shafts and said boxes having collars on the outside forming bearings for said guide frame, a drill shaft mounted in the guide frame, operating connections between the aligned shafts and the drill shaft, and mechanism by which the drill shaft is advanced and retracted. 100

3. In an apparatus of the character described, a main and a supplemental frame turnably adjustable with relation to each other, said main frame having horizontally disposed aligned shafts near one end and said supplemental frame having its lower portion turnably mounted on an axis which is coincident with that of the shafts, means for varying the angle of one frame relative to the other, means for holding the supplemental frame in its adjusted position, a boring device guided and movable upon the second frame, a rack bar loosely connected with the head of the boring bar, a pinion engaging the rack, and mechanism whereby said pinion may be revolved in opposite directions to raise or depress the borer. 115

4. In an apparatus of the character described, a frame, horizontally aligned shafts thereon near one end, a vertical frame turnably mounted on an axis which is coincident 130

with that of the shaft whereby the angle of the vertical frame may be varied relative to the first frame, means for fixing the vertical frame in its adjusted position, a rack bar 5 guided and movable upon said vertical frame, a shaft mounted in the upper portion of the vertical frame and having a pinion engaging the rack bar, mechanism whereby said shaft may be turnable in opposite directions to raise or lower the rack bar, a boring device having an upwardly extending shaft with a head or collar thereon, clamps or yokes upon a rack bar adapted to loosely inclose said head, and mechanism by which 15 said shaft may be revolved while being raised or depressed.

5. In an apparatus of the character described, a main frame, horizontally disposed alined shafts thereon, a vertically disposed frame having its lower portion turnably mounted on an axis which is coincident with that of the shafts, a vertically disposed boring tool, a head or collar fixed upon the shaft thereof, a vertically movable rack bar carried by the vertical frame having yokes or 20 clasps within which the collar and shaft are turnable, said horizontal shafts having bevel-gears upon their adjacent ends, a bevel-gear 25 on the boring tool shaft engaging both of said gears and through which the boring shaft is slidale whereby motion is simultaneously transmitted to drive the boring device, and to reverse the second shaft.

6. In an apparatus of the character described, a vertically guided boring device and loosely guided rack bar, horizontal shafts in line, bevel-gears upon their inner ends and upon the boring bar whereby motion is transmitted to drive the boring device and the 30 second shaft, clutches upon each of the shafts, a sprocket-wheel carried by one member of each clutch, a journaled shaft having

a pinion engaging the rack bar, and sprocket-wheels registering in line with those of the previously described shafts, and connecting 45 chains whereby the engagement of one clutch acts to revolve the pinion shaft to move the rack and boring device in one direction, and the engagement of the other clutch acts to move the boring device in the opposite direction. 50

7. In an apparatus of the character described, a main frame, a supplemental adjustable guide frame, a boring device carried by said frame, said device including a shaft 55 with a spirally disposed web and guiding point at the lower end, cutting tools fixed around the lower end of the revoluble shaft, mechanism whereby the shaft is rotated and simultaneously advanced or retracted, and 60 means surrounding the boring tool and operating upon the surface of the ground around the hole for displacing the removed earth.

8. In an apparatus of the character described, a boring tool including cutting bits, a shaft upon which said bits are carried, and a spirally disposed web around the shaft a bearing and guiding frame, mechanism by which the boring apparatus is revolved, 70 mechanism by which it may be raised or depressed while being revolved, and a device surrounding the boring tool and revoluble upon the surface and around the hole which is being made whereby the excavated earth 75 is constantly thrown away from the opening.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

CHARLES L. BELTZ.

Witnesses:

GEO. H. STRONG,  
CHARLES A. RENFIELD.