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C. KLEINSCHMIDT.

WOOD BORING APPARATUS.

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NO MODEL.

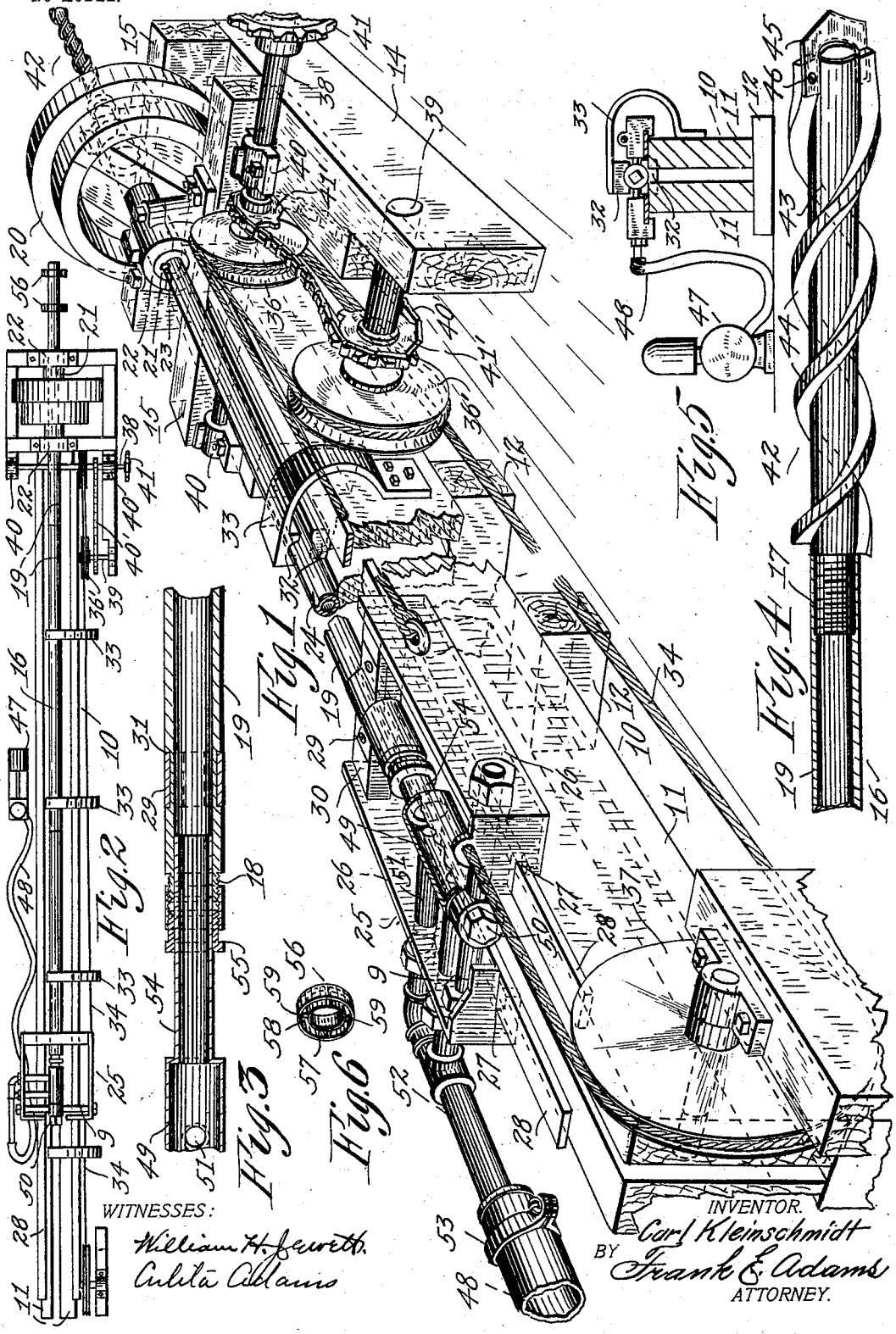


Fig. 1

Fig. 2

Fig. 3

Fig. 4

Fig. 5

Fig. 6

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UNITED STATES PATENT OFFICE.

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WOOD-BORING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 772,043, dated October 11, 1904.

Application filed March 10, 1903. Serial No. 147,161. (No model.)

To all whom it may concern:

Be it known that I, CARL KLEINSCHMIDT, a citizen of the United States of America, and a resident of the city of Seattle, in the county of King and State of Washington, have invented certain new and useful Improvements in Wood-Boring Apparatus, of which the following is a specification.

My invention relates to improvements in wood-boring apparatus, and has special reference to an apparatus of this class which is especially adapted to bore holes of extreme length in piles, columns, or like structural members.

Among numerous objects attained by this invention and readily understood from the following specification and accompanying drawings, included as a part thereof, is the production of a simple and inexpensive boring apparatus embodying essential features of adaptability, utility, and general efficiency, which renders the apparatus rapid and positive in action, insures free delivery of the borings from the bore-hole, and renders it practicable to form holes of extreme length in piles, columns, beams, or like structural members.

The above-mentioned and other objects equally as desirable are attained by the constructions, combinations, and arrangements of parts as disclosed on the drawings, set forth in this specification, and succinctly pointed out in the appended claims.

With reference to the drawings filed herewith and bearing like reference characters for corresponding parts throughout, Figure 1 is a view in perspective of my improved boring apparatus shown with the center portion of the spindle and main frame broken away and a part of the bore-cleaning appliance removed. Fig. 2 is a view in plan of the apparatus, shown on small scale, with the auger removed and the spindle partly advanced. Fig. 3 is a view in vertical longitudinal section of a portion of the spindle and a part of the bore-cleaning appliance connected therewith. Fig. 4 is a view in perspective of the auger employed and shows a portion of the spindle connected therewith and indicated in diametrical section. Fig. 5 is an end view of the apparatus, on small scale, looking from the rear and shows the main frame in vertical transverse section taken on line 5 5 of Fig. 1; and Fig. 6 is a view in perspective of one of the bore-entering spindle-guides.

This invention comprehends mechanism for boring holes in piles, columns, or the like and means to apply fluid in the bore-hole during the operation of boring to remove borings from said hole.

The boring mechanism is conveniently supported on a suitable main frame 10, which comprises a bed composed of horizontally-disposed timbers, as 11, of extreme length secured parallel to each other on suitable transversely-disposed sills, as 12, and at the head end of this bed forwardly-extending timbers, as 14, are placed at opposite sides thereof, and cross-pieces 15 are secured upon these timbers adjacent their forward ends.

The boring mechanism includes a bore-entering spindle 16, which is rendered of extended length and preferably composed of sections of tubing, as 19, detachably connected together by means of a screw-threaded counterbore, as 17, Fig. 4, formed in one end and a screw-threaded counter portion 18, Fig. 3, formed on the opposite end of each section, which serve to interlock the abutting sections and leave the periphery and bore of the spindle smooth and of a uniform diameter throughout and permit of the attachment of additional sections to increase the length of the spindle, if desired, and of the disconnection and replacement of sections which might become unfit for further use. This spindle is formed tubular to afford a way longitudinally thereof for the passage of fluid, and it is movably mounted in a horizontal position on the frame or bed 10, so that it can be rotated and simultaneously advanced or retracted longitudinally relatively to the work, and this spindle is driven to rotation by means of a drive-pulley or the like, as 20, which is fixedly mounted on a suitable sleeve 21, rotatably supported at the head end of the bed in bearings, as 22, arranged on the cross-pieces 15. This sleeve is

formed with the bore of suitable diameter to slidably receive the spindle 16, and a feather 23 is seated on the wall of this bore and slidably engaged in a suitable feather-way, as 24, formed longitudinally in the periphery of the spindle, whereby upon the application of power to the pulley 20 the spindle is driven to rotation and is free for longitudinal movement. The rear or back end of spindle 16 is preferably connected to a cross-head, as 25, which is movably mounted on the main frame 10 for reciprocative travel longitudinally thereof and is suitably connected to said spindle to force same to travel therewith. This cross-head includes oppositely-disposed L-shaped side pieces 26, connected together at the desired separation by a distance-piece 9 and each formed with a guide-embracing notch 27 in the free end of the foot portion, and these pieces are suitably separated for said notches to engage with the outer edges of the guides, as 28, which consist of sections of flat metal fastened on the upper surface of the bed at each side with suitable lateral projection therefrom to clear the toe of the side piece from the side of the bed.

The spindle 16 is connected to the cross-head by means of a split box or bearing 29, which is formed with laterally-projecting stems 30 at opposite sides of the hub, which are secured at the ends to the side pieces of the cross-head and bear upon the guides. This bearing is formed with the hub of equal diameter to the diameter of the spindle, and the bore thereof is rendered of suitable size to fit in an annular groove 31, formed in the spindle adjacent the rear end, so that the exterior surface of the bearing between the stems 30 will lie even with the periphery of the spindle and pass between suitable top and bottom box parts 32, which are placed at suitable points along the spindle to steady same, and the bottom box parts 32 are supported on the main frame in any suitable manner, while the top box parts 32 are hung from suitable brackets 33, which are preferably formed substantially semicircular to clear the cross-head 25 and are secured on one side surface of the main frame.

The spindle 16 is advanced and retracted by means of a suitable rope-feed, preferably consisting of a cable 34, which is connected to cross-head 25, and disposed rope-sheaves, as 36, 36′, and 37, arranged to carry and drive the cable to move said cross-head either forward or backward on the guides 28, as desired. As now considered the sheaves 36 and 36′ are fixedly mounted on respective rotatably-mounted shafts, as 38 and 39, the former of which is disposed transversely to the main frame, at the head end thereof, and journaled in bearings 40, arranged on the side timber 14, and the latter is journaled rearwardly of the former in suitable apertures formed in one of said side pieces and in the adjacent timber of the main frame, and these shafts are operably connected by means of sprocket-wheels 41′, fixedly mounted thereon, and a sprocket-chain 40.

The sheave 37 is suitably rotatably supported as an idler at the rear end of the main frame in any convenient manner, and the cable 34 is fastened by one end to the rear end of the cross-head and passed over said idler, and thence forwardly to and about sheave 36, and then rearwardly and about sheave 36′, and again forwardly and over sheave 36, and again rearwardly to the forward end of said cross-head, to which it is secured. This rope-feed is driven by means of a suitable sprocket-wheel 41 or the like, which is fixedly mounted on shaft 38 and receives power from any suitable source, (not shown,) as a counter-shaft driven from a main shaft by cross-belts or the like, so that the direction of rotation of said sprocket can be reversed as desired to advance and retract the spindle.

As now considered a twist-auger 42 is employed as the boring medium, and this auger preferably comprises a tubular shank or body, as 43, substantially equal in diameter to the diameter of spindle 16, suitable spiral ribbons or threads 44, wrapped thereabout to form a double helical thread along the shank, and a suitable cutter 45, which is conveniently removably attached to the forward end of the body and preferably comprises a substantially U-shaped plate formed with oppositely-disposed cutting-lips on the outer edge of the base part. This cutter is of suitable width to cut a hole large enough in diameter to receive the body of the auger freely, and it is secured in place by clamping the end portions of the stems against the side surfaces of opposite ribbons 44 by means of suitable screws 46. The rear end portion of the shank of auger 42 is suitably screw-threaded to fit the screw-threads in the counterbore 17 of the forward section of the spindle 16, and the bore thereof is left open and clear throughout to conveniently afford a passage-way through the auger, so that fluid passing under pressure along the bore of the spindle will pass into the bore of the auger and find discharge at a point adjacent the cutting end thereof, and when the auger is working forwardly and forming the bore-hole in the work the discharging fluid will pass rearwardly through said hole about the body of the auger and spindle and serve to clear the borings therefrom, and thereby prevent congestion of the borings in the bore-hole.

The passage-way or bore in spindle 16 is connected to a pump, as 47, or other suitable means adapted to transmit fluid under pressure to said way by means of a line of flexible conduit, as a hose 48, which is of suitable length to allow the spindle to be advanced and retracted as desired, and this hose is connected with said way by means of suitable pipe-fittings, which includes a cylindrical receiving-

chamber 49, substantially equal in exterior diameter to said spindle and arranged concentric thereto in the rear part of cross-head 25 and conveniently secured in place by means of a bolt, as 50, seated in the distance-piece 9. Connected with this chamber 49 are a plurality of laterally-projecting pipe-sections 51, which are of comparatively small diameter, so that they will pass between the top and bottom half-bores 32, and these pipes are connected with a main pipe, as 52, in any suitable or desired manner, and the flexible conduit 48 is connected with this main pipe by means of a clamp 53 or the like. The chamber 49 is connected with the passage-way in the spindle 16 by means of a forwardly-extending section of pipe 54, which is secured to the forward end of said chamber and formed of suitable diameter to fit snugly but freely in the bore of the spindle, so that the spindle will be free to rotate about said pipe, and a suitable stuffing-box, as 55, is mounted on the rear end of the spindle about this pipe to prevent leakage.

Suitable bore-entering spindle-guides, as 56, Fig. 6, are employed when desired to bore a hole of considerable depth, and these guides each comprise a spider consisting of an inner thin ring, as 57, formed with a bore of suitable size to receive the spindle 16, an outer thin ring 58 of suitable diameter to fit freely within the bore-hole, and radially-disposed arms or the like between said rings arranged to leave openings of suitable size for the passage of fluid through the guide when in the bore-hole. These guides are placed on the forward end portion of the spindle, and suitable countersunk set-screws or the like are arranged in the bodies of the guides, by which they can be secured to the spindle after a portion thereof has entered the bore-hole, and when so secured the guides will enter said hole as the spindle advances and serve to keep same from sagging.

In the present embodiment water is the fluid considered for the purpose of cleaning the borings from the bore-hole, and the pump 47 is of any desired or ordinary construction adapted to transmit this fluid under pressure from a suitable source of supply to the passage-way in the spindle, so that the fluid discharging from the point of the auger will be forced to travel back through the bore-hole about the auger and spindle under considerable pressure, and thereby serve to flush the bore-hole and forcibly remove the borings, which are materially assisted in their primary backward movement by the helical threads of the auger. This flushing of the bore-hole prevents congestion of the borings in the hole and allows the boring to be continued uninterruptedly to any depth desired, and by the use of this bore-cleansing appliance holes of extreme length can be rapidly formed in piles, columns, or like structural members by using the boring mechanism heretofore described.

To bore a hole longitudinally in the center of a pile or the like, an operation of the apparatus would occur substantially as follows: The spindle is first set in retracted position, and the pile to be bored is then suitably supported at the head end of the machine concentric with said spindle. Power is then applied to pulley 20 and to the sprocket-wheel 41, so as to rotate and advance the auger simultaneously, and after the auger has bored into the pile a short distance the pulp is started to supply water to flush the bore-hole. If the hole is to be of extreme length, the guides are successively secured to the spindle as it advances at suitable intervals to support same and the boring continued uninterruptedly until a hole of the desired depth is formed, when the pump is stopped and the rope-feed is reversed to withdraw the auger.

This apparatus is simple of construction and operation, has few parts likely to get out of order, and by its use holes of extreme length can be bored in piles, posts, columns, or like structural members, as may be desired, for the introduction of compounds in the members to protect them from the ravages of the teredo or for any other useful purpose.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent of the United States of America, is—

1. In an apparatus of the nature indicated, the combination of a bed, a sleeve rotatably mounted at the head end of said bed, a feather in the bore of said sleeve, a horizontally-disposed tubular spindle of extended length slidably fitting in said sleeve, a feather-way formed longitudinally in the spindle, a driving-wheel fixedly mounted on said sleeve, a cross-head slidably mounted on said way and connected with said spindle, feed-works operatively connected with said head, a tubular auger of greater cutting diameter than the diameter of said spindle and attached to the head end thereof, fluid-transmitting means, and a flexible conduit connected with said transmitting means and with the bore of the said spindle.

2. In an apparatus of the nature indicated; a bore-entering spindle-guide comprising a thin inner ring, a thin outer ring, and arms connecting said rings.

3. The combination with the bed of a cross-head slidably mounted thereon, a hollow spindle slidable in unison with said cross-head, means for rotating said spindle, a receiving-chamber mounted in said cross-head and communicating with the interior of said spindle, and fluid-transmitting means in communication with said chamber.

4. In combination with the cross-head, a hollow spindle having one of its ends rotatably mounted in said cross-head, means for

supporting the outer portion of the spindle, means for rotating said spindle, a receiving-chamber mounted in said cross-head and communicating with the interior of the spindle, a plurality of pipes communicating with said chamber, and fluid-transmitting means.

5. In combination with a hollow spindle and the means for operating the same, a receiving-chamber, a pipe leading from the chamber and projecting into the spindle, a plurality of pipes communicating with the chamber, a pipe common to said last-named pipes, fluid-transmitting means, a flexible conduit connected with said transmitting means and with the last-named pipe.

6. In combination with the spindle, a means for rotating the same, means for slidably supporting the same, and means for sliding said spindle comprising sheaves arranged adjacent the opposite ends of the spindle and an intermediate sheave, flexible connections operatively connected to said spindle, and passing over said sheaves whereby they will move simultaneously in the same direction, and power-transmitting means connected to one of the end and intermediate sheaves.

7. In combination with an auger-body hollow throughout its length, a cutter-head in the form of a U-shaped plate secured to one end thereof.

8. In a machine of the type set forth, a bore-entering spindle-guide comprising a plurality of spaced-apart rings arranged one within the other and being secured together.

9. In combination with an auger-body hollow throughout its length, a cutter-head having its body portion extending across one end of said auger-body in advance thereof, and having rearwardly-projecting ends secured to the exterior of the auger-body.

Signed at Seattle, Washington, this 23d day of February, 1903.

CARL KLEINSCHMIDT.

Witnesses:

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