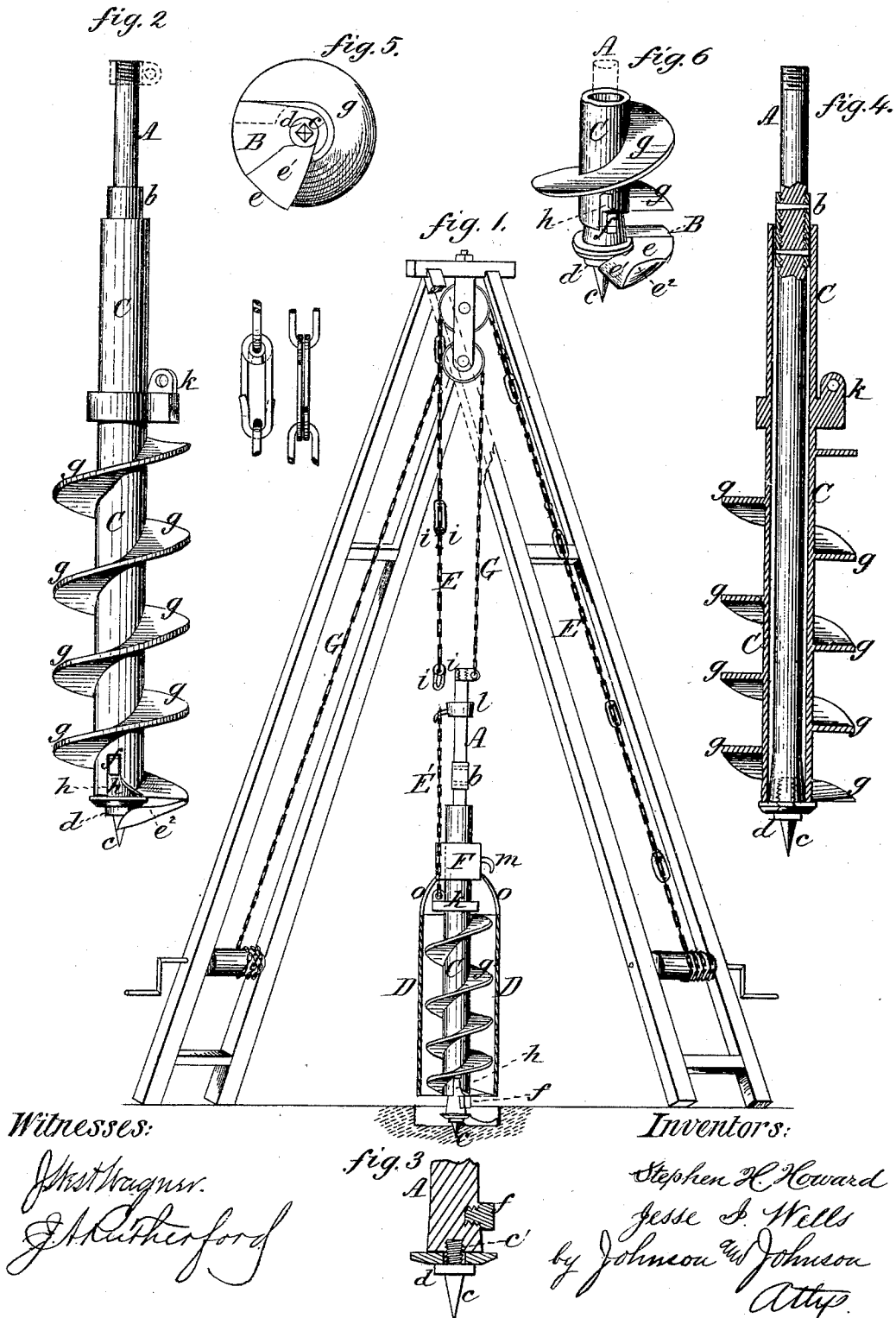


S. H. HOWARD & J. I. WELLS.

EARTH-AUGER.

No. 175,987

Patented April 11, 1876.



UNITED STATES PATENT OFFICE.

STEPHEN H. HOWARD AND JESSE I. WELLS, OF TRENTON, TENNESSEE.

IMPROVEMENT IN EARTH-AUGERS.

Specification forming part of Letters Patent No. **175,987**, dated April 11, 1876; application filed March 2, 1876.

To all whom it may concern:

Be it known that we, STEPHEN H. HOWARD and JESSE I. WELLS, of Trenton, in the county of Gibson and State of Tennessee, have invented a new and useful Improvement in Earth-Augers, of which the following is a specification:

Our improvements relates to that class of earth-augers adapted for deep borings. The boring-shaft is in sections. The lowest section swelling at its end, and socketed to receive the centering device which also locks a bottom plate thereto. This bottom plate is made to coincide with and form a continuation of the bottom vane of the worm, as will be described presently. It carries a colter or boring-blade, which overlaps said plate, and is riveted thereto. This bottom plate which carries the colter is fastened to the lowest section of the boring-shaft by a locking device, having a button bearing and terminating in an angular piercing centering point. The boring-blade has a downward-cutting edge, and an upward-shaving edge, the inner point of the cutting-edge extending under the button which fastens the bottom plate, and approaching piercing centering point, so that the cutting of the earth is commenced almost from the very center of the well, and acting in combination with the angles of the centering point to effect this result. The earth-carrying worm is cast solidly around a hollow tube, which is of less diameter than and surrounds the boring-shaft, and the lower vane of this worm coincides with the bottom blade of the auger-shaft, and thus forms a continuous bottom vane. The worm easily locks and unlocks with the boring-shaft by means of a stud on said shaft, and a slot in the bottom of the worm-tube, one side of which slot inclines to the bottom of the tube, and forms a guiding way for the stud, so as to permit of its easy and automatic entrance into said slot as the boring-shaft turns. Both the boring-shaft and the worm-tube revolve as one, when so locked, and the power is brought as near as possible to the resistance. To prevent the friction of the earth between the vanes against the sides of the well, and also to prevent its partially falling into the well when the worm is raised to discharge its contents, we provide an in-

casing-barrel, open at top and bottom, which, when the worm is raised above ground, is drawn up until the worm is laid bare, and its contents discharged, when the barrel is again dropped down over the worm to perform its function, as before. Arched bows at the top of this barrel terminate in a collar, which surrounds the extended portion of the worm-tube.

Prominent and valuable among the improvements we have made is the gain-twist of the worm-vanes. As the vanes approach the top there is a gain or increase in the space between the vanes, thereby allowing the earth to become loose as it nears the top of the worm, instead of packing. The whole device is raised and lowered by a tripod or well-derrick. The chain for raising the auger is in sections—one section of which is always attached to a collar upon the worm-tube below the bow-sleeve of the inclosing-case—and within said inclosing-case, and while the boring progresses, the other end is attached to a collar above on the boring-shaft. This chain is connected by double hooks to section after section let down over a pulley from a windlass as the boring progresses, and new sections of boring-shaft are added, so as to keep it always above ground. The collar upon the shaft to which it is attached is movable to be slipped up the shaft as new sections are added, the different sections of this chain being connected at the same time. This connection is made by double hooks—both hooks of the one section entering the lower link of the next from opposite sides—the preceding connection of the chain of sections being disengaged and attached to the shaft-collar as the shaft descends. This division and separation of the chain are for the purpose of preventing its winding around the shaft. There is also a feed-chain, which is not, however, sectional; but which is attached by swivel connection with the top end of the boring-shaft, and feeds down as the shaft descends, and when a new section of shaft is added it is attached to its top, and so continues. This chain is also used to draw up the boring-shaft when necessary, or when the boring is finished. But the invention is clearly set forth in the following description and claim, and illustrated in the accompanying drawings, in which—

Figure 1 represents an elevation of our improved earth-auger, in connection with its derrick, the inclosing barrel or case being in section to show the worm and its connection with the boring-shaft; Fig. 2, an elevation of the worm detached to illustrate our method of avoiding packing by the gain-twist; Fig. 3, a section showing the manner of securing the cutting-blade to the shaft; Fig. 4, a section of the auger and boring-shaft; Fig. 5, a bottom view of the boring-blade or colter; and Fig. 6 a perspective view of the top of such boring-blade.

Reference being had to these drawings, A is the boring-shaft, which is, as usual, in sections, united by suitable jointings, firmly secured by sleeve-couplings *b*, lined with a female thread, which receives a male thread cut upon each section of shaft A, and when screwed up a pin is passed through coupling and shaft. To this shaft we apply the power in any suitable manner, and of itself it is the boring agent. It terminates in a piercing centering-point, *c*, the descent of which into the soil is limited by a button, *d*, or a shouldered head. This piercing-point is angular or of pyramidal form, its angles cutting the ground. Secured to the shaft A by this button *d* is a plate, B, which carries the colter or boring-blade *e*, which overlaps said plate, and is riveted thereto. This boring-blade or colter *e* has a double continuous cutting-edge, *e*¹ *e*², the part *e*¹ curving downwardly in a supposed under line, and extending under the button *d*, and approaching the piercing centering-point *c*, whereby the cutting is commenced at the very center of the boring, the exact central cutting being done by the angles of said centering-point. This colter penetrates the soil, and, cutting, throws the earth over upon the plate, to be carried up as the action progresses, as will be presently fully understood. The part *e*² has a circumferential and upward curve in a supposed line over the plate, and its peculiar function is to shave and smooth the sides of the well, and thereby prevent friction in the descent of the inclosing case or barrel of the device, which will be mentioned hereinafter more fully. For this purpose the shaving-edge *e*² is in a circumferential line outside the periphery of said barrel. The plate B is secured to the lowest section of shaft A, as follows: The hub portion, or that portion adjoining the shaft, has a circular opening, through which the screw-stem *e'* of the piercing-point *c* passes into the screw-socket in the end of said shaft, and thus clamps the said plate in position. The thread is right and left, so that as the boring action goes on the tendency is to tighten the gripe of the screw, and thereby always securely clamps the plate upon the end of the shaft.

The vanes *g* of the carrying-worm are cast solidly around a tube, C, which rises some distance above the topmost vane of the worm. The boring-shaft A, which, to have a free vertical movement, is of less diameter than this

tube C, and has, at the bottom, a slot, *h*, one side of which slot inclines to the bottom of the tube, and forms a guiding-way for a stud, *f*, upon shaft A, so as to permit of the easy and automatic entrance of said stud into the locking portion of said slot as the boring-shaft turns. This permits not only of the integral action of shaft and tube, but brings the power nearer the resistance. By this means, also, the boring-shaft A is unlocked or disengaged from the worm-tube C, and said tube permitted to be raised for the discharge of earth without disturbing the shaft.

The vanes *g* of the worm increase or gain in distance apart as they near the top, so that the earth which is carried up by them continues loose, because the pressure which forces the earth up the carrying-vanes *g* of the worm is not resisted, but, on the contrary, impetus is given by the increasing space between the vanes in which the earth disperses and spreads as it advances. Were the vanes equidistant, the resistance and the weight of a confined mass would securely pack the earth in the worm, and thus produce a retarding friction, and also cause a delay when the worm is required to discharge its contents. The bottom vane of the worm laps upon the bottom plate B of the boring-shaft, and its termination is flush with the end of the colter *e*, (lapping also upon plate B) so that coinciding they jointly form the bottom vane of the carrying-worm. The worm is inclosed within a barrel or casing, D, which holds the earth in connection with the worm, and prevents friction against the sides of the wall. Its connection and uses with the auger will hereinafter more fully appear.

The means and manner of operating our auger are as follows:

Referring to the drawings, Figure 1, the chain E, for raising the auger device is in sections. These sections are connected by double hooks *i i*, the hooks of the one section both entering the link of the other section from opposite sides, and when once entered they are not likely to become disconnected, nor likely to be straightened by strain, a stronger connection than could be afforded by a single hook. While boring, to prevent the chain winding around the shaft, that section of the chain E', which is fastened to a collar, *k*, upon the worm-tube C, to raise the device, is disconnected and hung upon a hook in a movable collar, *l*, upon the boring-shaft. The collar *k* is just below the top of the barrel-casing, (which surrounds the worm,) so as not to be in the way of raising this barrel when necessary. As the boring progresses new sections of shaft A are added, the movable collar *l* is slipped up, and its hook made to hold the added section of chain E until it becomes necessary to repeat this as the shaft descends, to keep the chain E above ground. When the auger-worm is full of earth the section E' is disconnected and hooked by the double hooks to the continuous chain of sections E,

or the raising-chain, and serves to draw up the auger. When the auger is drawn above ground, as shown in the drawing, a plank is slipped under the auger from both sides, so as to support the auger; then the chain is disconnected from collar *l*, (upon the shaft,) and attaches to a hook, *m*, which projects from a band, *F*, which surrounds and slides over the worm-tube *C*, and which is connected to the barrel *D* by bows *o o*, and by this means the barrel *D* is drawn up, leaving the auger bare and emptying it of its earth. Then the barrel *D* is dropped down over the auger, the chain returned to its connection, and the device lowered again—the chain, of course, being disconnected from its section, as before described. The chain *G* on the left is the feed-chain, and is attached to top section of boring-shaft *A* by swivel-joint, or in any suitable way, to avoid twisting, and is used to regulate the feed of the auger in boring. It is also used to draw up the shaft *A* whenever it is necessary to raise the shaft.

We claim—

1. In an earth-auger having auger-carrying worm for the earth, the vanes *g* thereof, increasing in their distances apart from bottom to top, for the purpose of avoiding the packing of the contained earth.

2. In an earth-auger having the combination of worm *C*, and shaft *A*, the plate *B* of said shaft, carrying the overlapping colter *e*, and secured by stemmed button *d* passing through said plate into a socket in the shaft.

3. The combination of an earth-auger carrying-worm, whose vanes increase in their distance apart as they near the top, with an inclosing barrel-case, for the purpose of avoiding packing in said barrel.

4. The combination, in a well-auger, of the angular centering-point *e*, with the double counter-cutter *e e¹ e²*, the plate *B*, and the clamping centering-point *e*, as and for the purpose described.

5. The combination, in an earth-auger, of the sectional chain *E E'*, provided with the double hook *i i*, with the hooks *k l m* of the shaft, tube, and barrel, as and for the purpose set forth.

In testimony that we claim the foregoing, we have affixed our signatures in the presence of two witnesses.

STEPHEN H. HOWARD.
JESSE I. WELLS.

Witnesses:

H. L. RAINES.
W. B. HIGHT.