2 Sheets—Sheet 1.

H. & J. KELLY.

EARTH-BORING APPARATUS.

No. 176,008. Patented April 11, 1876.

fig. 1.

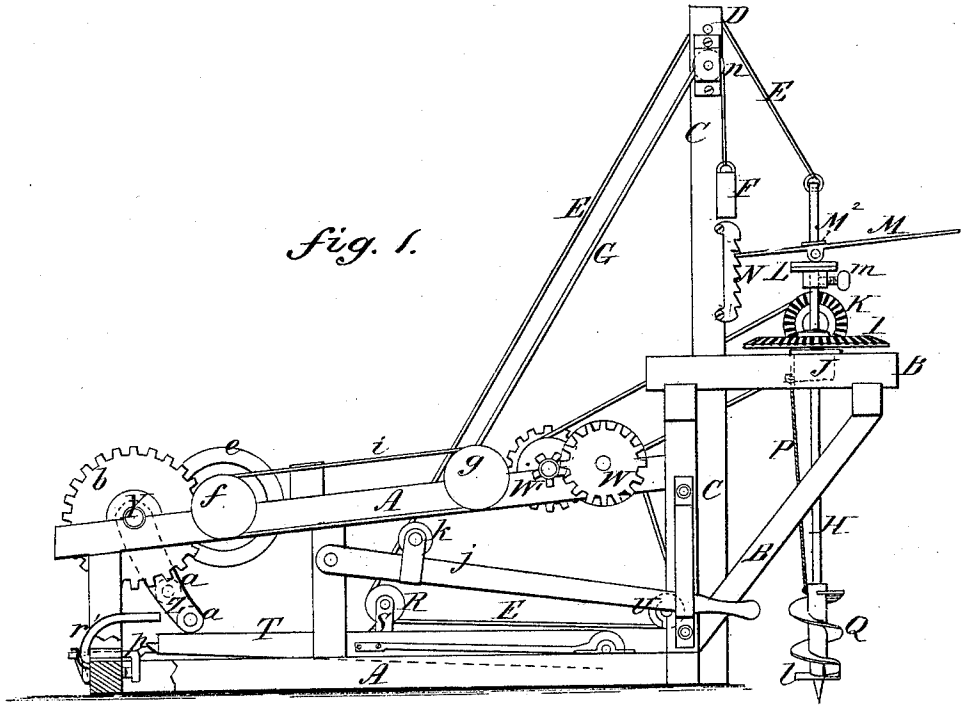

fig. 7.

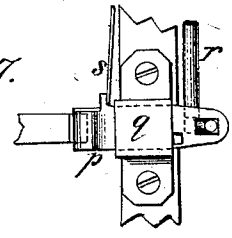

fig. 2.

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Inventors:

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Joseph Kelly.

By Johnson & Johnson

Attys

2 Sheets—Sheet 2.

H. & J. KELLY.

EARTH-BORING APPARATUS.

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fig. 3.

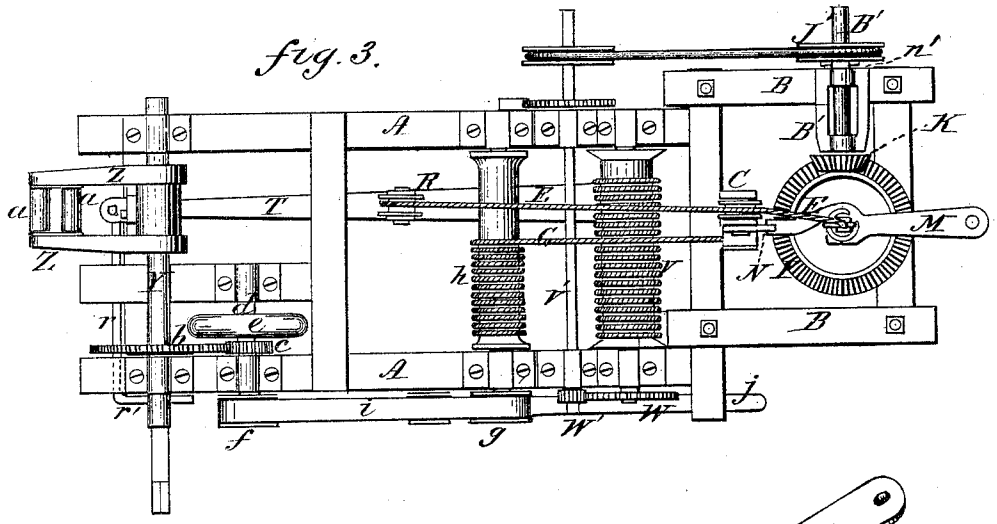
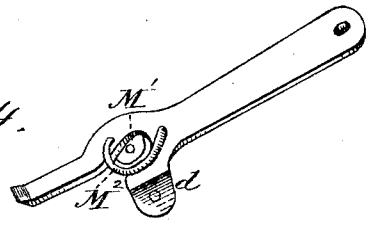
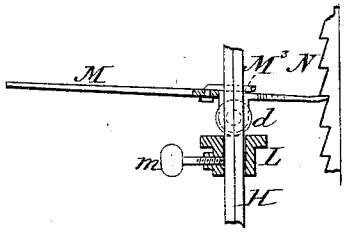


fig. 4.





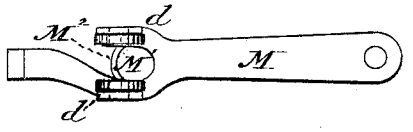


fig. 5.

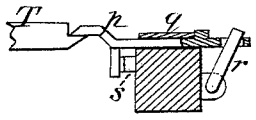
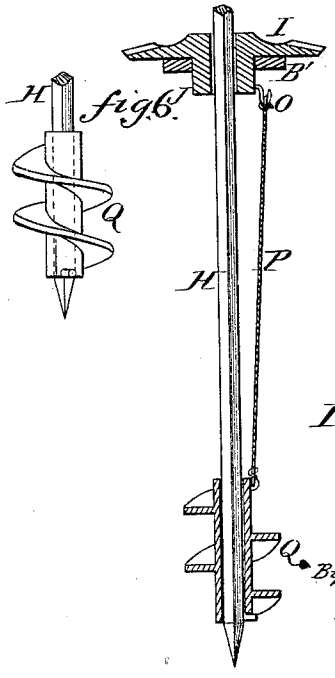


fig. 6.



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UNITED STATES PATENT OFFICE.

HENRY KELLY AND JOSEPH KELLY, OF OSAGE, IOWA.

IMPROVEMENT IN EARTH-BORING APPARATUS.

Specification forming part of Letters Patent No. **176,008**, dated April 11, 1876; application filed February 7, 1876.

To all whom it may concern:

Be it known that we, HENRY KELLY and JOSEPH KELLY, of Osage, in the county of Mitchell and State of Iowa, have invented a new and useful Improvement in Earth-Boring Machinery, of which the following is a specification:

Our invention has reference to the parts of a combined portable machine for drilling and boring wells, and to the machinery for operating the same; and the nature of our improvements will be fully understood from the following description, reference being had to the accompanying drawings, in which—

Figure 1 is a side elevation of machine embodying our improvements; Fig. 2, an elevation of the machine as seen from the opposite side; Fig. 3, a top view; Fig. 4, detail views of the pressure-lever, being section, perspective, and bottom views; Fig. 5, a detail view of the detent for holding down the main lever when out of operation; Fig. 6, the auger enlarged; and Fig. 7, top view of detent.

A A is a strong frame, at one end of which is a tall standard or mast, C, and at the top of this standard is a pulley, D, over which passes the rope or chain E, which suspends the drill. This rope passes from pulley D down around a pulley, R, in a bearing, S, swiveled upon the main lever T, and thence around a roller, U, up to a cast-iron roller, V, of same length as roller U. To this cast-iron roller V the end of the rope is secured, and on it it is wound and unwound in the various operations of the machine. On the main shaft Y are the rigid arms Z, provided with friction-rollers *a a*, which impinge in the rotation of the main shaft upon the end of the main lever T, and at each revolution of the main shaft press down the main lever T, thus drawing down the rope E, which passes over the pulley D and hangs down into the hole in the rock, and at the end of which is fastened the heavy rod and drill, thus elevating the drill, and as the rigid arms pass the main lever it is released, and the drill is allowed to fall with great force on the rock to be penetrated, and at each revolution of the main shaft the operation is repeated. There is a very great strain on the rigid arms Z on the main shaft Y. These rigid arms are ordinarily made in two separate pieces bored out to fit the shaft, and fastened thereon by means of keys and key-seats at the proper distance from each other to permit the introduction of the rollers *a a*. This construction renders them liable to work loose, so that they get out of line with each other, and the rolls *a a* "angle" across the machine and do not work well. To obviate this difficulty we cast the arms Z in a single piece, and usually cast them on the shaft Y, so that they cannot work loose or get out of line, and the boring out and key-seating and keying up of the arms are dispensed with; or they may be cast in a single piece and bored out and keyed on the shaft.

When for any cause it is desired to raise the drill out of the hole, the roller V is revolved by means of the chain connection with the main shaft, and the roller in revolving winds up the rope, and thus raises the drill. In this operation it is necessary that the main shaft should revolve to give the motion desired, and it is also necessary that the main lever T should not work, the oscillating motion of the main lever not being desirable at this time. This is accomplished by providing at the rear end of the frame a detent, *p*, sliding in a guide, *q*, and operated through a rock crank-shaft, *r*, and hand-lever thereon, and a reacting spring, *s*. When it is desired to hold the lever T down the lever is depressed, and its lower corner being rounded, as shown, it falls readily into engagement with the detent.

When the heavy rod and drill have been let back into the hole again, and it is desired to commence drilling, the lever T is released by drawing and holding back the detent by means of the hand-lever *r'*, thus allowing the free motion of the lever T. When it becomes necessary to clean out the drillings, it is done by means of a sand-pump, F, Fig. 1, with a valve bottom attached to a rope, G, that passes up over the pulley *n* on the standard C, down to and is wound on the windlass *h*, which is operated by connection with the running parts of the mechanism.

A large gear-wheel, *b*, on the shaft Y, meshes with a small one, *c*, on shaft *d*, which also carries a fly-wheel, *e*, and pulley *f*, the latter communicating motion, when desired, to the

pulley *g* and windlass *h* through a belt, *i*, which is too slack to drive the pulley *g* unless tightened by means of the belt-tightener *j*, consisting of a lever fulcrumed on the frame, and carrying a friction-pulley, *k*. The windlass *h* takes up and pays out the rope G, passing over pulley *n* on the standard C, and carrying at its other end an ordinary sand pump, F, with a valve bottom.

By tightening the belt *i* the windlass *h* is thrown into operation from the driving-shaft, and the sand-pump, being full, is raised and emptied, and, by loosening the belt, is lowered again, and the horse or other power does not need to stop; but the power is used just when and where it is needed, thus making this operation a part of the function of the machine, instead of raising and lowering the sand-pump by hand or other independent power, as is usually done.

It is evident that instead of the belt and pulley gearing *f g i* and belt-tightener *j k*, any other gearing capable of being disconnected, so as to throw the windlass *h* into and out of operation at will, may be used.

For earth-boring, the bracket-frame B B is detachably secured to the strong frame A A at its upper end, carrying the auger-shaft H, which is square or angular in cross-section throughout its length, and has upon its lower end a fixed cutter, *l*. Upon a horizontal support, B, of the bracket-frame, lies the bevel-gear wheel I, having its gear side uppermost, and an elongated hub, J, projecting downward through the support B. This bevel-wheel I has a square or angular hole through its center, through which passes the shaft H, and it consequently rotates with said shaft, while permitting the vertical motion of said shaft through it. The bevel-wheel I derives its motion from a bevel-pinion, K, on a short horizontal shaft, which connects with the motive power, and carries a pulley, J′. This pulley is movable on the shaft, and has a recessed face engaging with a key or pin, *n′*, so that it may be engaged or disengaged by means of a lever or other suitable means, (not shown,) to throw the auger into or out of operation at will. The shaft H carries upon it a flanged collar, L, which has a square or angular hole made through it to fit the shaft, so that the collar must turn with the shaft, and at the same time is capable of vertical adjustment.

A set-screw, *m*, is used to fix the collar at any desired height upon the shaft. This flanged collar serves as a bearing for a pressure-lever, M, one end of which engages with the perpendicular rack N, screwed upon the standard C. The other end of the lever serves as a handle, by which a man may produce and regulate at will a downward pressure on the shaft in boring, and consequently may force the auger into the earth faster or slower, as may be found best. The middle of the lever M is formed into a yoke, M^1, embracing the shaft H. The opening of the yoke M^1 is closed by a hook, M^2, which prevents the lever from slipping out of place, and secures an even pressure on both sides of the flanged collar L. Each arm of the yoke M^1 is provided beneath with friction-rollers *d*, resting on the flange of the collar L, so that the shaft and collar may rotate freely, while the collar forms a continuous bearing for the lever M. The adjustable collar and the rack on the standard C enable the operator to adjust the lever to the ascent or descent of the shaft H. To the elongated downwardly-projecting hub J on the bevel-wheel I, below its horizontal support B, is attached a hook, O, on which is hung the chain P, connected to the auger Q. This auger has the ordinary spiral blade, and has a square or angular bearing on the shaft H, like the bevel-wheel and collar, and likewise turns with the shaft while slipping freely up and down on it.

The rope or chain E passes from the roller V around the roller U and pulley R, up and over the pulley D on the standard C, and when boring earth the roller V derives its motion from the shaft B′ through connection with the horizontal shaft V′ by cog-gear W W′.

The operation of the earth-boring mechanism is as follows: The auger Q, being placed on the lower end of the shaft H, by connection with the motive power is revolved, and penetrates the earth, being aided by the pressure of the lever M upon the collar L. While the auger is working, the pulley or chain-wheel J is disengaged from the pin *n′*, and thus the connection between the motive power and the rope-roller V is severed, causing the rope-roller to be idle. When the auger is full the bevel-pinion I is disengaged from the horizontal shaft by any suitable device, (not shown,) and the shaft H ceases to revolve. The chain P is now detached from the hook O, and hooked or otherwise connected with the chain or rope E, passing over the pulley in top of standard C, and the pulley or chain wheel J′ is put into engagement with the pin *n′*, and connection is thus made between the motive power and the rope-roller V, causing the latter to revolve, winding up the rope E, and raising the auger Q, filled with earth, out of the hole. A platform, slotted for the admission of the shaft H, is introduced under the auger, and the earth is emptied upon it. The platform is then removed and the auger let down again. The chain P again hung upon hook O, the windlass V is disconnected and the pinion K thrown into engagement for operating the auger, and the process of boring goes on. The shaft H is made in sections, and one section after another is added, according to the depth of the well, and this shaft remains extending down into the well, and the auger sliding up and down it, till the well is finished, when the whole is drawn up, the shaft H being taken apart section by section as it comes up.

We claim—

1. The arms Z on the shaft Y, cast or oth-

erwise formed in a single piece, substantially as and for the purpose set forth.

2. The arms Z, when cast solidly on the shaft Y, substantially as set forth, and for the purpose specified.

3. The combination, with the lever T, of the detent *p*, operated through rock crank-shaft and lever *r*, and reacting spring *s*, substantially as and for the purpose set forth.

4. The combination of the windlass *h* and the rope G, to which the sand-pump F is attached, with the power connecting and applying devices *i j c b* of the running parts of the machine, whereby the windlass *h* may be operated at will, and the sand-pump may be automatically lowered and raised or thrown out of operation, substantially as described, and for the purpose set forth.

5. The combination, with the lever T, of the spring-catch device *p*, arranged to yield when struck by the lever and pass above it, whereby the movement of the latter is arrested, and it is held down out of the way while the machine is being used for other purposes, substantially as set forth.

6. The frame B B, supporting the boring machanism, and made detachable from the main frame A of the machine, substantially as set forth.

7. The adjustable collar L on the shaft H, in combination with the pressure hand-lever and rack, substantially as and for the purpose set forth.

8. The combination, with the shaft H and collar L, of the lever M, formed at its middle into an open yoke, M^1, and provided with the hook M^2, substantially as and for the purpose set forth.

9. The lever M, formed at its middle into a yoke, M^1, and provided with friction-rollers *d*, in combination with the flanged collar L and revolving shaft H, substantially as and for the purpose set forth.

10. The combination, with the boring-shaft H and the auger Q, of the rope P, attached to the hook O of the bevel-wheel hub J while boring, and detached therefrom for connecting with the rope E, for raising said auger, as herein set forth.

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

HENRY KELLY.
JOSEPH KELLY.

Witnesses:
A. E. H. JOHNSON,
J. W. HAMILTON JOHNSON.