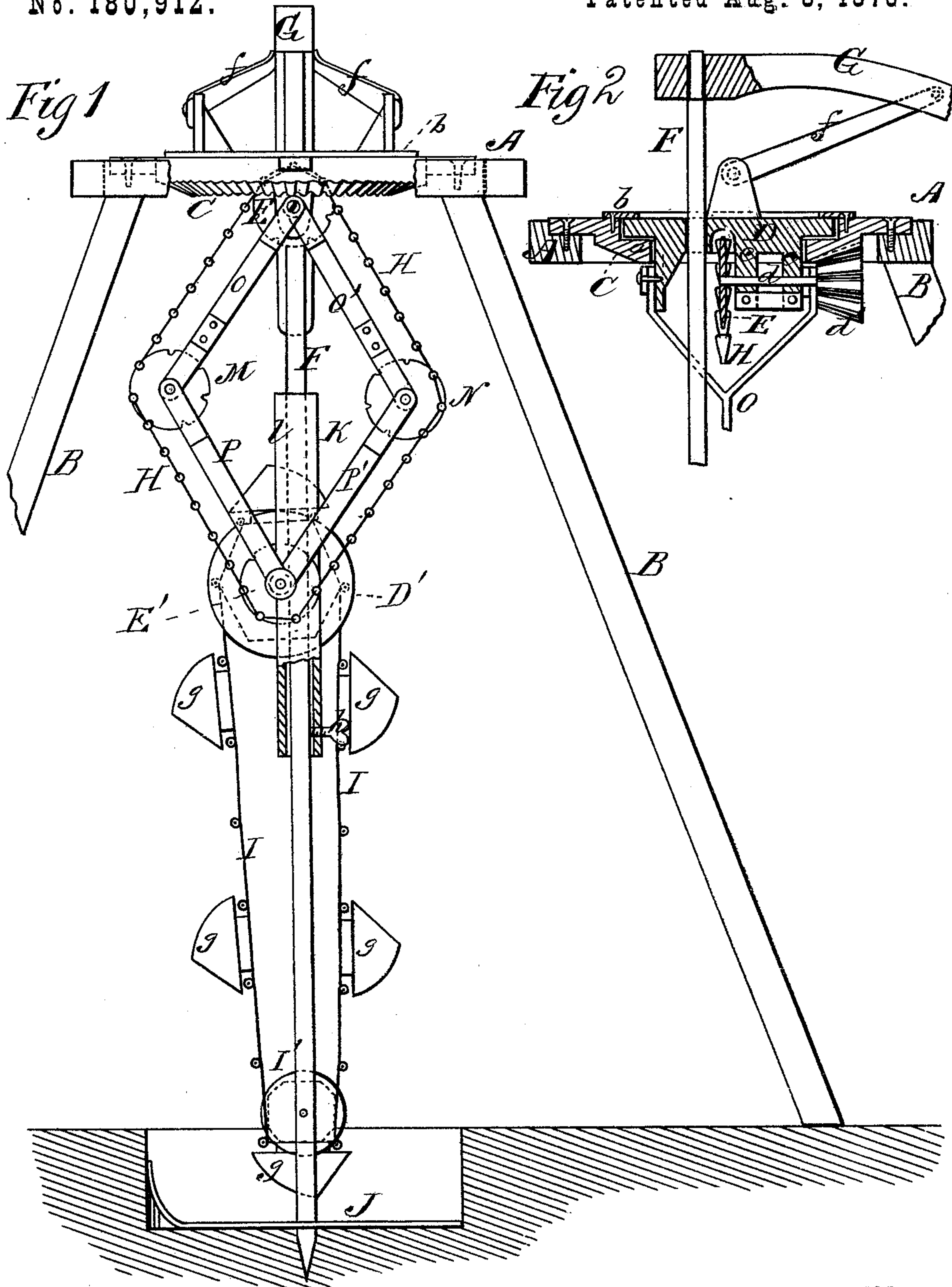


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EARTH BORING MACHINE.

No. 180,912.

Patented Aug. 8, 1876.



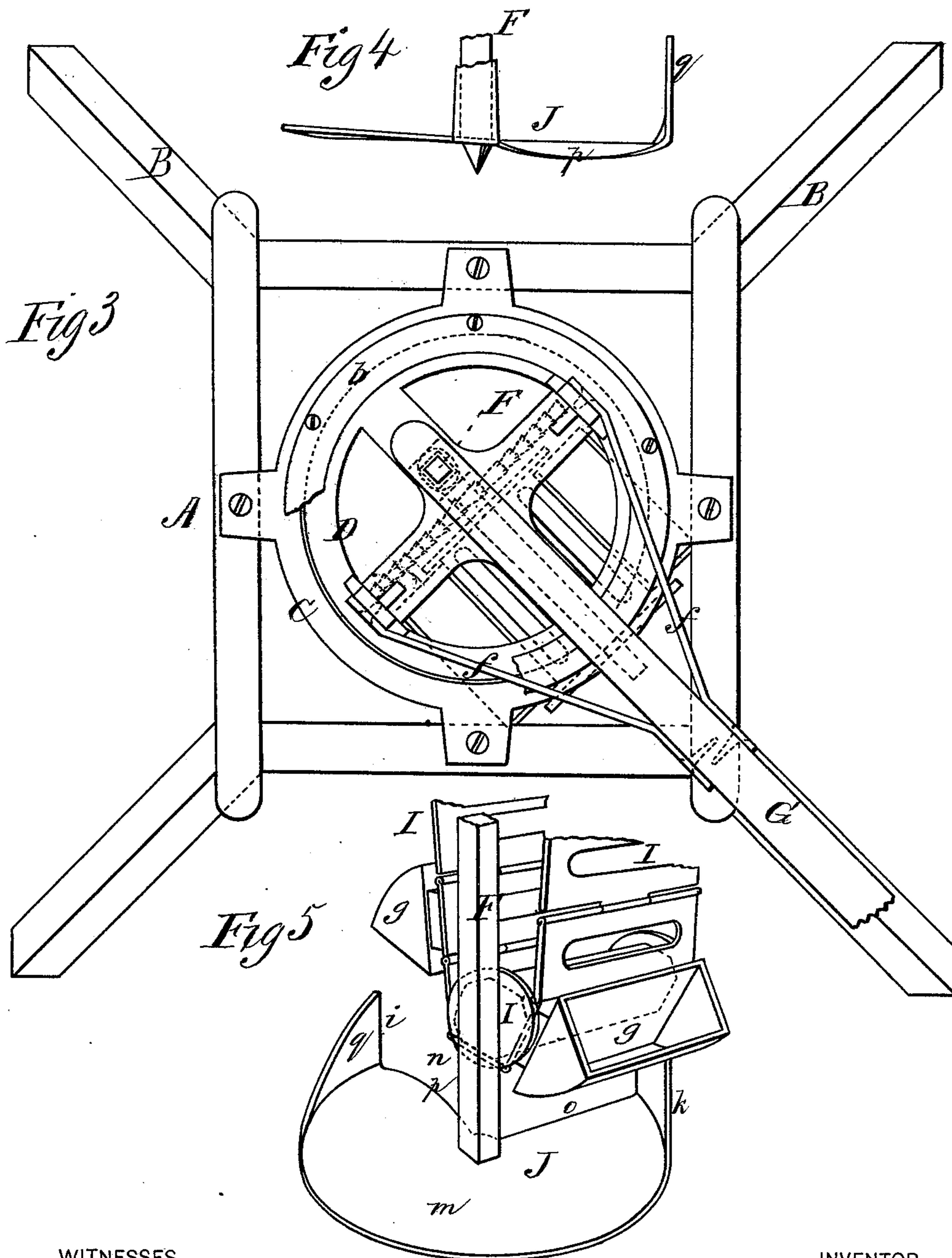
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INVENTOR  
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# UNITED STATES PATENT OFFICE.

SILAS R. OWEN, OF ST. JOSEPH, MISSOURI.

## IMPROVEMENT IN EARTH-BORING MACHINES.

Specification forming part of Letters Patent No. **180,912**, dated August 8, 1876; application filed July 15, 1876.

*To all whom it may concern:*

Be it known that I, S. R. OWEN, of St. Joseph, in the county of Buchanan and State of Missouri, have invented a new and valuable Improvement in Earth Boring and Hoisting Machines; and I do hereby declare that the following is a full, clear, and exact description of the construction and operation of the same, reference being had to the annexed drawings, making a part of this specification, and to the letters and figures of reference marked thereon.

Figure 1 of the drawings is a representation of a side view of my improved earth boring and hoisting machine. Fig. 3 is a top view thereof; and Figs. 2, 4, and 5 are detail views.

This invention has relation to improvements in earth-boring apparatuses; and the nature of the invention consists in combining with a fixed beveled master-wheel secured to the auger-frame, and annularly rabbeted upon its upper face, a disk seated in the rabbeted surface of the said master-wheel, operated by the auger-shaft and actuating the elevator mechanism, whereby a single motor is made to actuate the boring-bit and the elevator. It also consists in certain other minor details of construction, whereby very desirable results are obtained, as will be hereinafter more fully explained.

In the annexed drawings, the letter A designates a strong rectangular frame, preferably of wood, and supported at a suitable distance above the ground by means of spread legs B. The foot of these legs will bear upon the ground; but they may be secured to, and braced by, a second rectangular frame, which will then constitute the base of the device. C represents a beveled gear-wheel, resting on and secured to the frame A in a fixed position. As shown in Fig. 1, the teeth are upon the under side of this wheel. It is also provided upon its upper surface with an annular rabbet, *a*, adapted to receive a disk, D, which will be made of any suitable metal, and for the sake of lightness be cast with openings. Plate D is designed to rotate freely in its bearings on gear-wheel C, and will, in practice, be maintained therein by a flat annular strip of metal, *b*, rigidly but removably se-

cured to the said gear-wheel, and overlapping its joint therewith. Disk D is provided upon its under side with two spaced lugs, *c*, which afford bearings for the radially-arranged shaft *d* of a beveled pinion or traveler-gear, *d'*, meshing with the teeth of the fixed gear C. Shaft *d* carries upon its inner end a sprocket-wheel, E, the object of which will hereinafter appear, and is rotated by the rotation of disk D, thus actuating the sprocket or rag wheel E. F represents the boring-shaft, which is rectangular in cross-section, and passes upward through a corresponding aperture in disk D, the said aperture being in its diametrical line, but to one side of its center. G represents a sweep, which is secured to the upper end of the boring-shaft in the customary manner, and is connected with the plate D by means of metallic rods *f*.

It is evident, when power is applied to the sweep, that motion will be imparted to the boring-shaft, the disk, the shaft *d*, and, consequently, to the rag-wheel E, from which it will be transferred to an endless chain-belt, H. This belt passes around rag-wheel E, above described, and around a second rag-wheel, E', keyed or otherwise secured upon the shaft of drum D', operating an endless belt, I, carrying a number of spaced scoop-buckets, *g*, and the rotation of the disk necessarily actuates the drum, the elevator, and the borer J.

Drum D' is polygonal in cross-section, and has its bearings in a rectangular frame, K, one of the vertical bars *l* of which is tubular, and adapted to be passed on the boring-shaft. This sleeve is formed with a rectangular bore conforming to the shape of the shaft, and is vertically adjustable thereon. It is secured in position, when adjusted, by means of a set-screw, *h*. Belt I, above mentioned, is preferably of metal, and is made up of a number of rectangular sections of the same dimensions, and of a width equal to that of the faces of the polygonal drum, which sections are hinged or otherwise flexibly jointed together, so that they may readily adapt themselves to the curvature of the said drum. It also passes around a second polygonal drum, I', arranged slightly above the auger J, and having its bearings at one end in the auger-



shaft, and at the other in the upright angular bracket *k*, secured at one end to the said shaft, and at the other to the edge of the auger. In order to secure an automatic adjustment in respect of tension of the chain-belt *H*, as the auger penetrates into the earth, and to permit such penetration without lengthening the belt until it has pierced to the extent of several feet, I have devised the following: The belt itself will be made considerably longer than is necessary to pass around rag-wheels *E E'*, and the excess will be taken up by means of two sprocket-wheels, *M N*, having their bearings in the lower ends of the two vertically-vibratory arms *O O'*, the upper ends of which are bifurcated and pivoted in any suitable manner to the under side of disk *D*. Arms *O O'* are connected to the shaft of the drum *I* by means of vertically-vibratory arms *P P'*, by which means the latter are made to form a toggle-joint with the former, the effect of which is as follows: Frame *K* having been thrust upward until wheels *M N* have been sufficiently separated to tighten belt *H*, the set-screw is applied and the frame secured to the shaft. Power is then applied to the sweep, and the auger *J* forced into the ground. This will necessarily increase the distance between the rag-wheels *E E'*, as the former is fixed to the disk *D*, and the latter to the drum, and cause wheels *M N* to vibrate inward toward each other, at the same time holding the chain-belt tense. When the auger has gone down a sufficient distance to bring rag-wheels *M N* nearly in contact with the boring-shaft, the elevator-belt will be divided at one point, and another section added thereto, and, if necessary, to the boring-shaft, when frame *K* will be thrust upward, and the operation be continued as before, until water is reached. The auger which I propose to use in connection with the above mechanism, is of the following construction: It consists, primarily, of a circular metallic disk, *m*, secured against rotation to the lower end of shaft *F*, having an angular piece cut out of its edge, forming a space, *n*, the sides or edges bounding which are equal in length to the scoop-buckets. One side or edge, *o*, of this space is so arranged that the scoop part of the buckets shall barely clear the auger, and that the scooping-edge of the said buckets and the edge *o* of the auger shall be in the same vertical plane at the moment of such clearance. The other edge is bent downward below the level of the body of the auger to form a planer or scraper, *p*, and the outer end of the said planer will be provided with a raised vertical tooth, *q*, having a cutting-edge, *i*, the object of which is to smooth the walls of the well after and above the plane of the auger. The earth shaved off by the cutting-edge of the bit *p* will be pushed over the plane surface of the auger to its

edge *o*, and will be scooped up by the buckets, raised out of the well, and delivered into a suitable receptacle. The auger and the elevator being secured to the attachments of the auger, and its shaft and the chain-belt to the disk and the frame, this operation of relieving the auger of earth will be continuous, and the bore of the well kept free of the cuttings.

In order to allow shaft *F* to descend uninterfered with by the sweep, the rods *f*, whereby it is connected to the disk, will be pivoted both to the disk and to the said sweep.

What I claim as new, and desire to secure by Letters Patent, is—

1. In combination with the beveled master-wheel *C*, fixed to the auger-frame, and annularly rabbeted upon its upper face, the rotating disk *D* and holding-ring *b*, substantially as specified.

2. The combination, with the fixed beveled master-wheel *C*, of the disk *D*, rotating therein, radial shaft *d*, having beveled gear *d'* and rag-wheel *E*, respectively, at its outer and inner ends, rag-wheel *E'*, chain-belt *H*, drums *D' I'*, an elevator-belt, *I*, scoops *g*, and an auger, substantially as specified.

3. In combination with the rag-wheel *E* and the boring-shaft of a well-boring apparatus, the vertically-adjustable frame *K*, applied on the said shaft, and carrying drum *D'* and rag-wheel *E'*, the endless chain-belt *I*, the vertically-vibrating toggle-jointed rods *O O' P P'*, tension rag-wheels *M N*, and an elevator mechanism, substantially as specified.

4. In combination with the rag-wheel *E* and endless chain-belt *I*, the vertically-vibrating arms *O O'*, carrying tension rag-wheels *M N* in their lower ends, the vertically-adjustable frame *K*, carrying drum *D* and rag-wheel *E'*, and the vibrating arms *P P'*, pivoted at one end to arms *O O'*, and at the other to the shaft of the drum, substantially as specified.

5. The auger *P*, consisting of a disk, *m*, having edges *o o*, bounding an angular opening in the perimeter, a down-turned lip or planer-bit, *p*, formed on one of the edges of the said opening, and an angular vertical projecting scraper, *q*, substantially as specified.

6. In combination with an auger having an angular opening in its perimeter, the endless belt *I* and buckets *g*, adapted to be successively brought with their scooping-edges in close proximity to one of the edges of the said opening, substantially as specified.

In testimony that I claim the above I have hereunto subscribed my name in the presence of two witnesses.

SILAS R. OWEN.

Witnesses:

E. V. RILEY,  
R. D. MUSSEY.