G. L. Witsil,

Boring Artesian Wells,

No. 52,102, Patented Jan. 16, 1866.

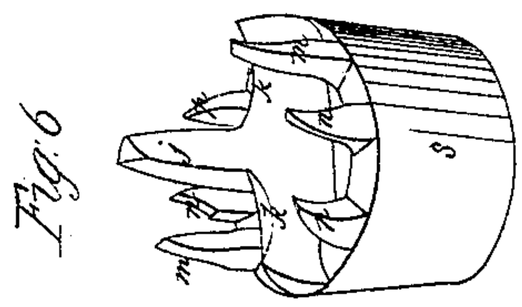
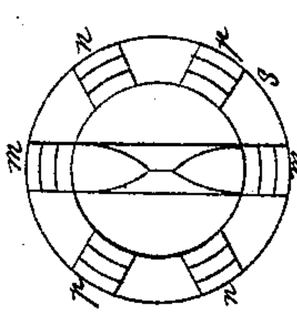


Fig. 6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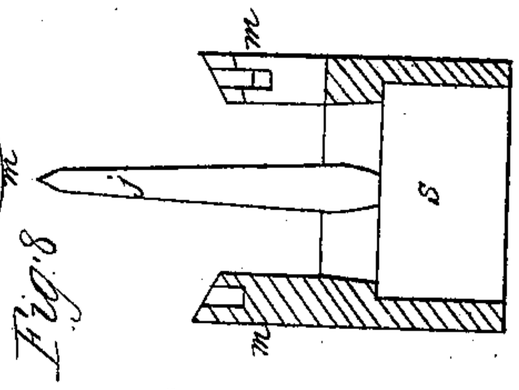
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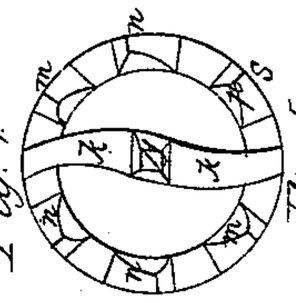
Fig. 4

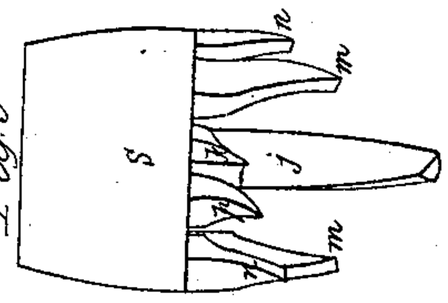
Fig. 5

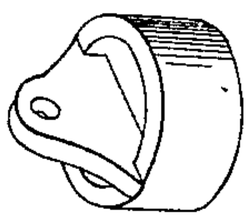
Fig. 9

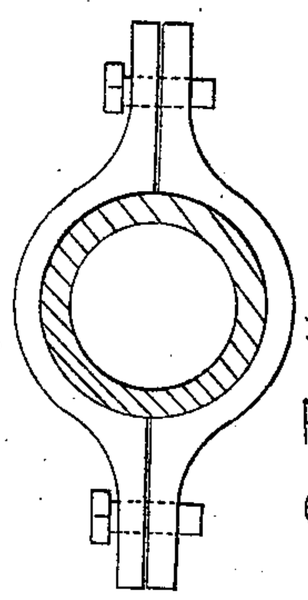
Fig. 10

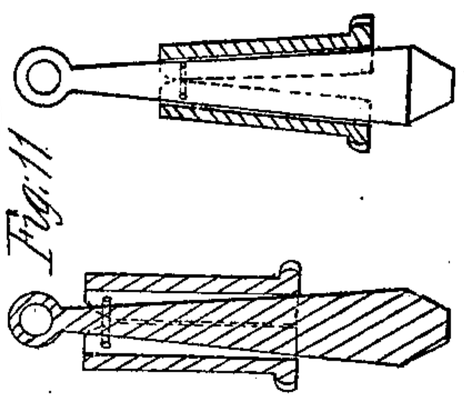
Fig. 11

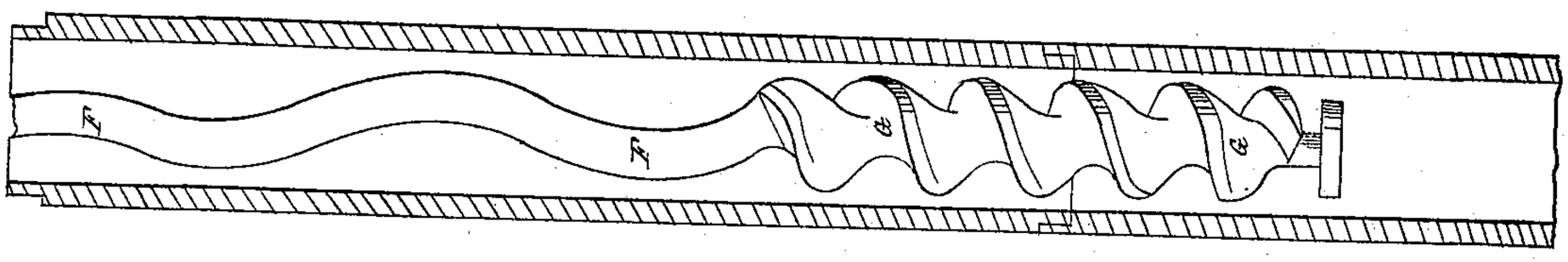
Fig. 3

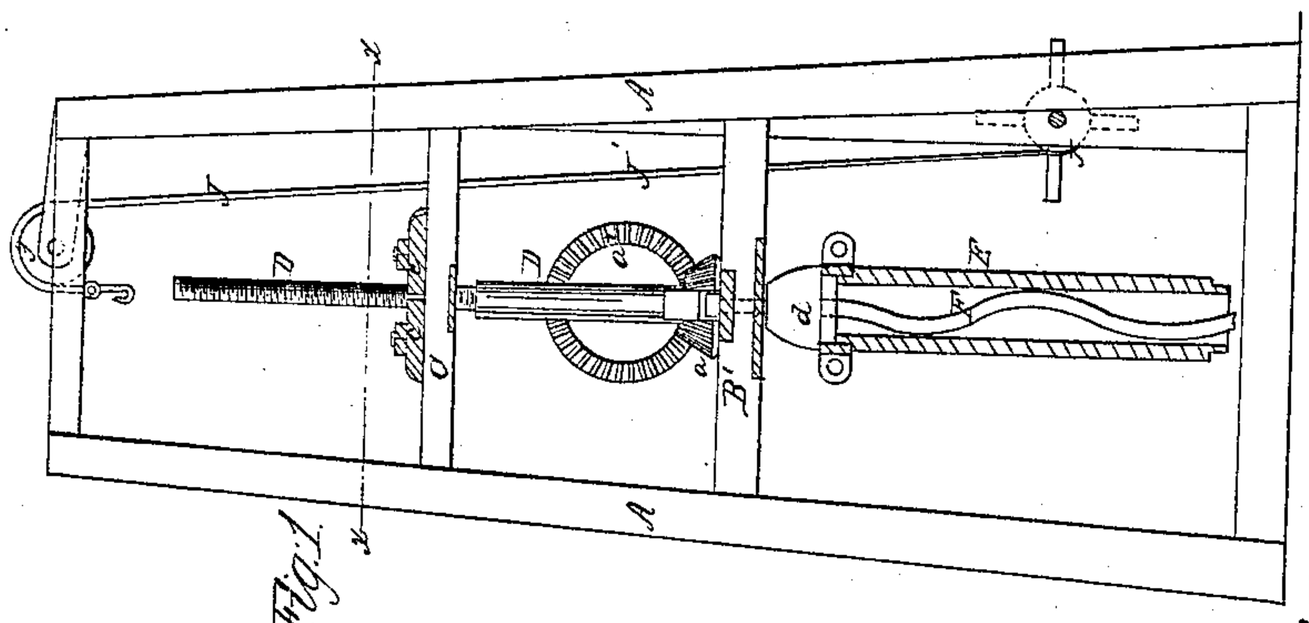
Fig. 1

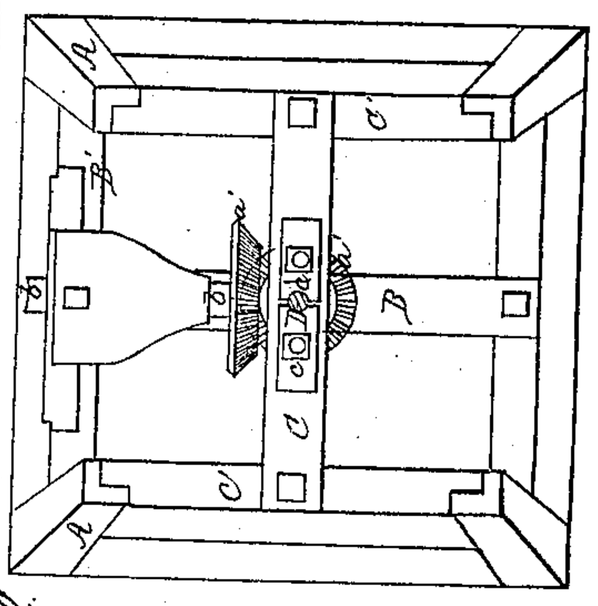
Fig. 2

Witnesses:
R. T. Campbell

Inventor
Geo. L. Witsil
by his atty
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UNITED STATES PATENT OFFICE.

GEORGE L. WITSIL, OF PHILADELPHIA, PENNSYLVANIA.

IMPROVED WELL-BORING APPARATUS.

Specification forming part of Letters Patent No. **52,102**, dated January 16, 1866; antedated January 3, 1866.

To all whom it may concern:

Be it known that I, GEORGE L. WITSIL, of the city and county of Philadelphia, State of Pennsylvania, have invented certain new and useful Improvements in Machinery for Boring Artesian Wells; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, making a part of this specification, in which—

Figure 1 is an elevation of one side of the machine for rotating the drill-shaft and elevating or depressing it. Fig. 2 is a horizontal section through Fig. 1, taken at the point *x x*. Fig. 3 is a diametrical section through the tubing, showing the construction of the elevator and its serpentine stem. Figs. 4, 5, and 6 show my improved drill. Figs. 7 and 8 show a modification of the drill. Fig. 9 is an elevating-cap for the tubing of the well. Fig. 10 is a yoke which I employ for supporting the tubing in the well. Figs. 11 are views of a contrivance for griping the tubing in the well when desired to withdraw the tubes from the well.

Similar letters of reference indicate corresponding parts in the several figures.

The main object of my invention is to facilitate the work of drilling or boring Artesian wells by means of machinery which is adapted for forcibly impelling the drill downward during the act of rotating it, and which is also so constructed that certain portions of it can be removed when it is desired to draw up the drill and certain other portions employed for this latter purpose.

My object is also to construct a drill in such manner that it will be more durable than drills hitherto employed, and consequently not require to be withdrawn from the well as often, at the same time provide for elevating the detritus from the drill and discharging it from the well as rapidly as it accumulates, all as will be hereinafter described.

To enable others skilled in the art to understand my invention, I will describe its construction and operation.

In the accompanying drawings, A represents a strong frame, which is somewhat larger at its base than it is at its highest point, for the purpose of making it steady and to afford a firm support for the contrivances which are employed to operate the drill. At a suitable point above the base of this frame A is a horizontal transverse beam, B, which extends across the middle of the frame, and is suitably attached to transverse beams B′ B′, so that it can be removed from the main frame at pleasure. Directly above this beam B is another beam, C, which is secured at its ends to cross-beams C′ C′, so that it can be readily removed therefrom at pleasure. In practice I shall seat the ends of beams B and C into recesses in their respective supporting-beams and tie the parts together with bolts or pins. The beam B crosses the beam C at right angles, as shown in Fig. 2.

In the vertical center of the frame A is a vertically-sliding shaft, D, which passes through the axis of a bevel spur-wheel, *a*, and is prevented from turning independently of this wheel by means of a tenon thereon fitting loosely into a longitudinal groove in the said shaft. The bevel-wheel *a* is supported upon the horizontal beam B and rotated by means of a bevel-wheel, *a′*, on a horizontal shaft, *b*. This shaft *b* has its bearings in standards which are mounted upon the beam B, and carries on its outer end belt-wheels or other contrivance by which motion can be communicated to the machinery. The vertically sliding and rotating shaft D terminates at its upper end in a long male screw, D′, which passes freely through the beam C and through half-nuts *c c*, which are secured upon this beam, as shown in Figs. 1 and 2. These half-nuts *c c* are secured in place by means of bolts, and they can be removed at pleasure, so as to release the screw-stem D′.

It will be seen that when the shaft *b* is rotated the bevel-wheel *a* will rotate the shafts D D′, and that simultaneously with this rotary movement these shafts will move in a direction with their length, either in ascending or descending.

If desirable, the shafts D D′ may be coupled together in such manner that they can be separated and a screw having a finer or coarser thread employed, as occasion requires.

On the lower end of the shaft D an enlargement, *d*, is formed, having a rabbet in its lower edge to receive a coupling-collar, which unites

this portion *d* to the upper end of the upper section of the well-pipe E, as shown in Fig. 1. As the well increases in depth the pipe is lengthened by the addition of other sections, the pipe being elevated a proper distance, and supported in an elevated position when desired to introduce new sections by means of a yoke, as represented by Fig. 10, which is made in halves and bolted together about the well-tube, so as to embrace and hold it firmly. This yoke will prevent the well-tube from dropping too far into the well. The enlargement *d* on the shaft D is also adapted for receiving and holding the upper end of a narrow serpentine stem, F, which is carried down to the drill or to an elevating-screw, G, which is so constructed as to free the drill of the detritus as rapidly as it is formed in any quantity, and elevate this detritus to the top of the well. The screw-elevator G is constructed, as represented in Fig. 3, with the upper surface of the spiral shelf flat and the lower surface rounding or inclined, which form is found to be free from any liability of clogging with the detritus. The stem F is made of the serpentine form, for the purpose of stirring and loosening the detritus during the operation of elevating it to the top of the well.

The operation of elevating the detritus from the well is performed by detaching the well-tube from the shaft D and allowing this shaft to rotate the screw, the tubing remaining stationary.

When it is desired to elevate the tubing bodily and to sustain it for any great length of time in such position, I employ a windlass, J, over which passes a rope, J′, that is carried up to the top of the frame A and passed over a pulley, *g*. This rope has a hook on its end, by means of which it can be attached to a contrivance represented in Fig. 9, or to the griping device represented in Figs. 11, which devices are firmly secured to the pipe, the one represented by Fig. 9 by clamps or screws and the one shown by Fig. 11 by the serrated expanding portions represented.

When the windlass J is to be used the beams B and C, with the shaft D D′ and bevel-gear, are all removed out of the way, leaving the frame A clear to allow the pipe to be lifted out of the well section by section.

The drill which I have represented by Figs. 4, 5, 6, 7, 8 is made tubular and attached to the lower end of the lower section of the tubing by means of clamping-collars, or in any other suitable manner. This drill S is constructed with a center bit, *j*, and two diametrical cutting-lips, *k k*. The routers *m n p* are secured into the edge of the drill-tube S, so that they can be readily removed therefrom at pleasure.

It will be seen by reference to the drawings that the pairs of cutters *m n p* vary in length, and that only two points can operate at the same time. Those lettered *m* are brought into action first and continue in action until they are reduced in length sufficiently to allow the next pair, *n n*, to operate. When these cutting-points are worn down a certain distance the cutting-points *p* begin to operate, and after these the points on the outer edges of the cutting-lips *k k*. When the cutting-points are all worn out the drill is withdrawn from the well and new points inserted instead. The cutting-points, which are of an equal length, are arranged diametrically opposite each other, so that they will operate in pairs.

If desirable, the cutting-points may be beveled in the form of chisels and two sets of such chisels used, as represented in Figs. 7 and 8, with routing-cutters between them. In this case the outer series of chisels will allow the inner series to be brought into action substantially as above described for the single cutting-points. The great advantage of such a drill is that fresh cutting-points will be successively brought into action until all the points of the drill are completely worn out, and for this reason the drill need not be removed from the well as often as is required when ordinary drills are used.

I do not desire to confine this part of my invention to any particular shape of cutting-points, as these will vary in form according to the different strata to be penetrated.

When the longest points of the drill have worn down sufficiently far to allow the next points to operate the drill may be drawn up out of the well and the dull points removed; or the cutting-points may be made of steel and welded to the drill, so that when these steel points wear off softer metal will be exposed, which will wear away more rapidly than the succeeding steel points.

In practice I make the slots between each pair of cutting-points as long, or nearly as long, as the points themselves, so that when the succeeding cutting-points are brought into action, in consequence of the first cutting-points wearing away, the blunt ends will not offer any material obstruction to the cutting-points which succeed them. If, however, it is found that the chisel will not penetrate the rock as rapidly with the blunt points as without them, they may be removed and the work proceeded with without the necessity of renewing the cutter-head or removing the sharp cutters.

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

1. Providing for giving a rotary and vertical motion to a shaft, D, which is adapted for receiving on its lower end the tubular sections E, and also for removing said shaft and the contrivances for operating it from frame A when desired to elevate the well-tube, substantially as described.

2. The combination of a windlass, J, rope or chain J′, and pulley *g*, or their equivalents, with the frame A and removable supporting-beams B C, substantially as described.

3. The shaft D, provided with a screw, D′, bevel-wheel *a*, and removable half-nuts *c c*, said

parts being sustained upon the cross-beams B C of a frame, A, and operating substantially as described.

4. Constructing a rock-drill with cutting-points varying in length, and so arranged that sharp cutters are successively brought into action as the longest points are worn out, substantially as described.

5. A center discharging-drill provided with cutting-points *m n p* and a center point, *j*, of different lengths, substantially as described.

Witness my hand in matter of my application for a patent for improvement in machinery for boring Artesian wells.

GEO. L. WITSIL.

Witnesses:

R. T. CAMPBELL,

E. SCHAFER.