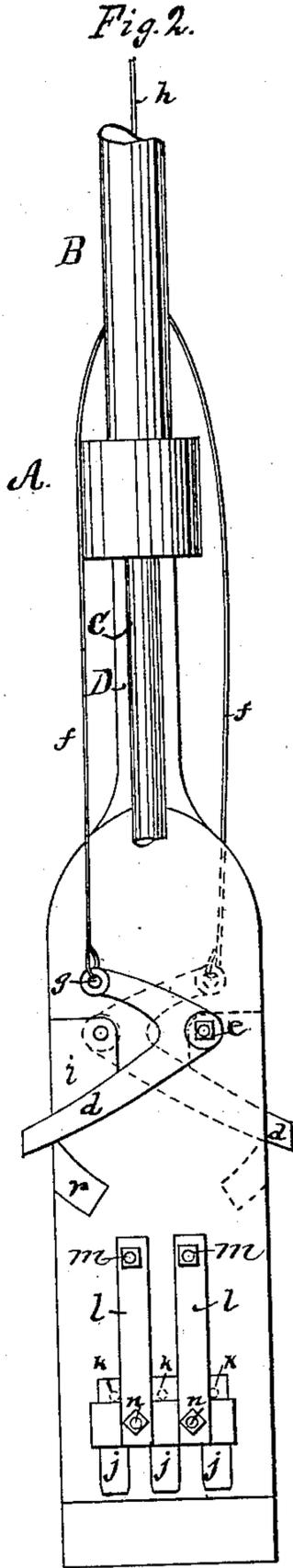
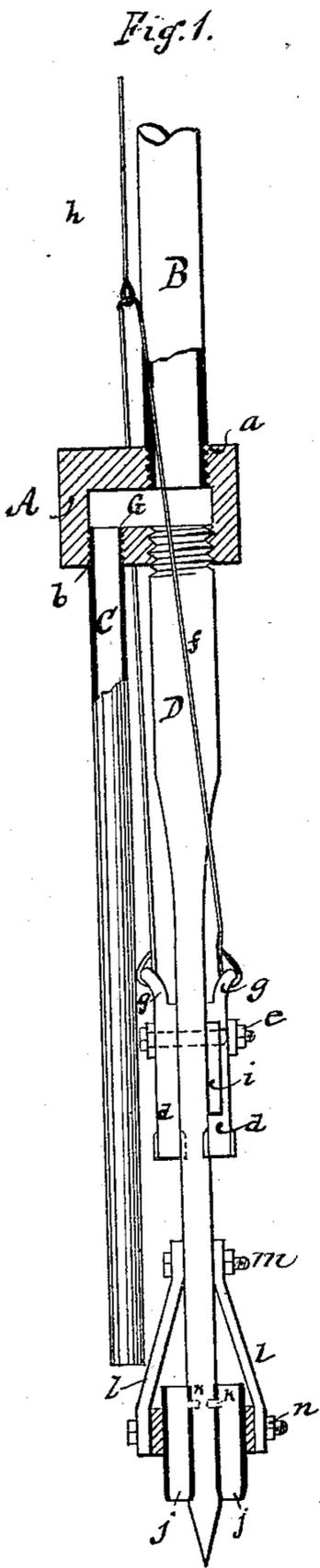


(No Model.)

H. C. SAFFORD.
TOOL FOR BORING WELLS.

No. 318,034.

Patented May 19, 1885.



WITNESSES:

A. Faber du Faur, Jr.
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INVENTOR

Henry C. Safford.

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UNITED STATES PATENT OFFICE.

HENRY C. SAFFORD, OF BROOKLYN, NEW YORK.

TOOL FOR BORING WELLS.

SPECIFICATION forming part of Letters Patent No. 318,034, dated May 19, 1885.

Application filed September 11, 1884. (No model.)

To all whom it may concern:

Be it known that I, HENRY C. SAFFORD, a citizen of the United States, residing at Brooklyn, in the county of Kings and State of New York, have invented new and useful Improvements in Tools for Boring Wells, of which the following is a specification.

This invention relates to improvements in tools for boring wells; and it consists in the combination, with the tool, of cleaning apparatus for removing the material of excavation without drawing the tool from the bore-hole, the same being washed out by passing a stream of water through cleaning-pipes attached to the tool.

The invention also consists of disintegrating-tubes for drilling in clay or similar material.

In the accompanying drawings, Figure 1 is a side elevation of the device. Fig. 2 is a front elevation of the same.

Similar letters indicate corresponding parts.

In the drawings, the letter A indicates the coupling, bored out and tapped at *a* to receive the cleaning-pipe B, which is firmly screwed into the same.

C is another cleaning-pipe, provided with threads *b*, and is screwed into a hole, G, provided with threads, in the bottom of the coupling A.

D is the drill, screwed in the bottom of the coupling A.

To the drill D are attached expanding reamers *d d'*. The reamers consist of elbow-levers, which are pivoted by means of bolts *e*, and can be turned about the same, so as to vary their cutting diameter by means of the rope *f*, connecting the two eyes *g* of the expanding reamers *d d'*, and connected with a rope, *h*, passing to the surface of the earth when the tool is used.

i i' are blocks secured to the drill D, and act as stops for the expanding toes.

r are slots in the drill D, in which the toes *d d'* slide.

j are disintegrating-tubes, secured to the blade of the drill by means of the pins *k*, entering the drill D, and the clamps *l*, secured

to the drill D by the bolts *m* and pressed against the disintegrating-tubes *j* by the bolt *n*.

After the drill D is set in motion, and when a sufficient quantity of the excavated material has accumulated, water is forced through the pipe B. Passing in the coupling A, the water passes in the bottom of the bore-hole through the pipe C, and washes the material of excavation upward and out of the bore-hole. Depending on the material of excavation, the water may be kept running continuously.

When sinking a hole in clay or similar earths, the drill D alone would have no further effect than to separate the material, which would close up again after each blow of the drill. To prevent this the disintegrating-tubes *j* are attached to the drill D. On the downward motion of the drill D the earthy material is forced up the disintegrating-tubes *j*, and leaves at the top of the same as bars of, to a certain extent consistent, material, which are easily washed up by the water passing through the cleaning-pipes B C, the cleaning-pipe ending a little above the top of the disintegrating-tubes *j*.

The object of the expanding toes *d d'* is to form a hole larger than the drill D would by itself, thus preventing the drill from becoming stuck in the bore-hole, and also to enable the bore-hole to be lined as the drilling proceeds.

When it is desired to withdraw the drill after lining, the expanding toes *d d'* are lowered, by means of the ropes *h* and *f*, until they lie wholly within the edges of the drill D, after which the drill can be removed in the usual manner.

I am aware that a well-boring drill has heretofore been provided with expanding bits or reamers, the same being connected by a rope with a drill-rod, so that when said rope is shortened or contracted by contact with water in the bore-hole the reamers are projected beyond the drill to enlarge the hole made by the latter.

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

1. The combination, substantially as here-
inbefore described, with the drill D, of the
cleaning-pipes B C and the coupling A.

2. The combination, substantially as here-
5 inbefore described, with the drill D, of the
disintegrating-tubes *j j*.

3. The combination, substantially as here-
inbefore described, with the drill D, of the
cleaning-pipes B C and the disintegrating-
10 tubes *j j*.

In testimony whereof I have hereunto set
my hand and seal in the presence of two sub-
scribing witnesses.

HENRY C. SAFFORD. [L. s.]

Witnesses:

E. F. KASTENHUBER,
WILLIAM MILLER.