JACOB SHELLEY & M. C. BULLOCK.

Improvement in Sinking Shafts and Excavating Tunnels and Cuttings.

No. 115,115. Patented May 23, 1871.

Fig. 1.

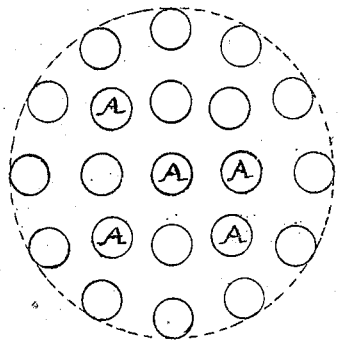
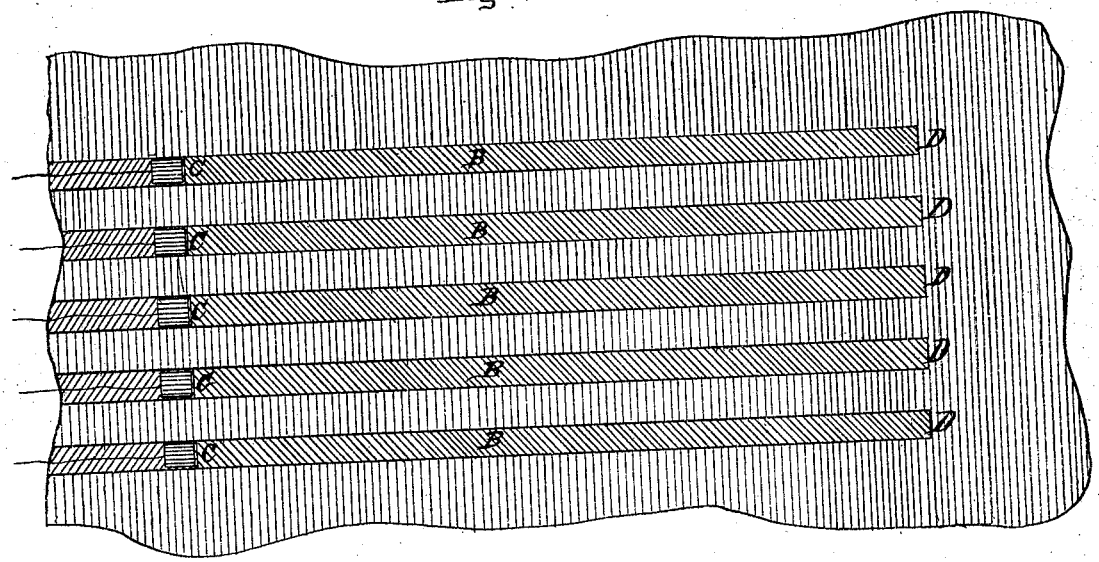


Fig. 2.



Witnesses { Wm. R. Wright / Thos. A. Burtt

Inventors.
Jacob Shelley,
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by their Atty
Horace Binney, Jr.

UNITED STATES PATENT OFFICE

JACOB SHELLEY, OF MAHANOY, AND MILAN C. BULLOCK, OF POTTSVILLE, PENNSYLVANIA.

IMPROVEMENT IN SINKING SHAFTS AND EXCAVATING TUNNELS AND CUTTINGS.

Specification forming part of Letters Patent No. 115,115, dated May 23, 1871.

To all whom it may concern:

Be it known that we, JACOB SHELLEY, of Mahanoy township, in the county of Schuylkill and State of Pennsylvania, and MILAN C. BULLOCK, of Pottsville, in the said county and State, have invented a new and useful Improvement in the art of Sinking Shafts and Excavating Tunnels and Railroad or other Cuttings; and we do hereby declare the following to be a full, clear, and exact description thereof, which will enable others skilled in the said art to practice our invention, reference being had to the accompanying drawing which forms a part of this specification, and in which—

Figure 1 is a plan or outside view, and Fig. 2 a vertical section of an excavation made according to our improvement.

The object of this invention is to effect the removal of a large quantity of material in a short time, and at a saving of labor and expense; and we accomplish this object by first boring all the drill-holes, then tamping or filling them all with suitable material, and then gradually shattering the rock in successive lifts by repeated explosions, as hereinafter described, until it is torn away to the bottom of the drill-holes.

The manner of practicing this invention is as follows: We drill a number of holes, A A, by means of diamond drills or other suitable apparatus, upon and within the circumference of the proposed excavation, as shown in Fig. 1. These holes are drilled to any required depth at which the boring-tools can be operated, (which may be even many hundred feet,) and the distance between them, as well as their diameter, will generally vary with the quality of the rock to be excavated. The holes are then tamped or filled with sand, or with a core of sand and clay, or with wood or any other suitable material. In sinking shafts it may be convenient to use water for this purpose. The tamping or filling B B, Fig. 2, does not extend to the mouth of the holes; but a clear space is left in each hole equal to the depth to which the rock can be torn away by a single explosion, as shown at C C. This depth will depend on the quality of the rock and the quantity and character of the explosive substance used, but it will not in general be less than a foot and a half nor more than twelve feet. A cartridge or charge of some explosive material is then inserted into each of the holes, resting against the filling, the holes are tamped over the charges in the usual manner, and the charges fired.

The effect of the explosion is to tear away the whole face of the rock as far as the line C C, the filling behind the cartridge taking the place of the solid rock in ordinary blasting to receive the force of the explosion and cause it to act outwardly, tearing away the rock throughout the entire sectional area of the excavation and all the way from the cartridges to the mouth of the holes, after which the fragments are readily removed in the usual manner. The filling is then dug out or pumped out with a sand-pump or otherwise removed so as to leave a clear space of sufficient depth in each hole, as before stated; charges are again inserted, and the operation repeated till the excavation is complete, or until the bottom D of the boring is reached. In the latter case the boring-tools are then applied again, and the operation proceeds as above described.

In sinking shafts, if the perforations A are filled with water a plug should be inserted into each to float or support the cartridge and prevent debris from dropping down into the hole, and the holes are then tamped over the charges with water, clay, sand, or other suitable material, in the usual manner.

After each explosion the plugs are removed and the water pumped out to the depth to which the rock can be torn away by a single explosion. The plugs are then inserted again, the holes charged and tamped, the charges fired, and the operation repeated, as above described. By means of this process a vast saving of time and labor is effected.

The method of excavation hitherto practiced requires the drilling machinery to be removed to a safe distance before each blast, and after the blast to be again placed and adjusted for each separate hole. Much time is consumed

in this manner, and the labor required to effect this frequent shifting of the machinery forms a heavy item of expense, all of which is saved by our improvement.

What we claim as our invention, and desire to secure by Letters Patent of the United States, is—

The above-described method of excavation, by first boring all the drill-holes to the depth required, or as far as they can conveniently be bored, filling them with suitable material, making a space for charging and tamping between the filling and the face of the rock, and shattering the rock in successive lifts by repeated explosions.

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