

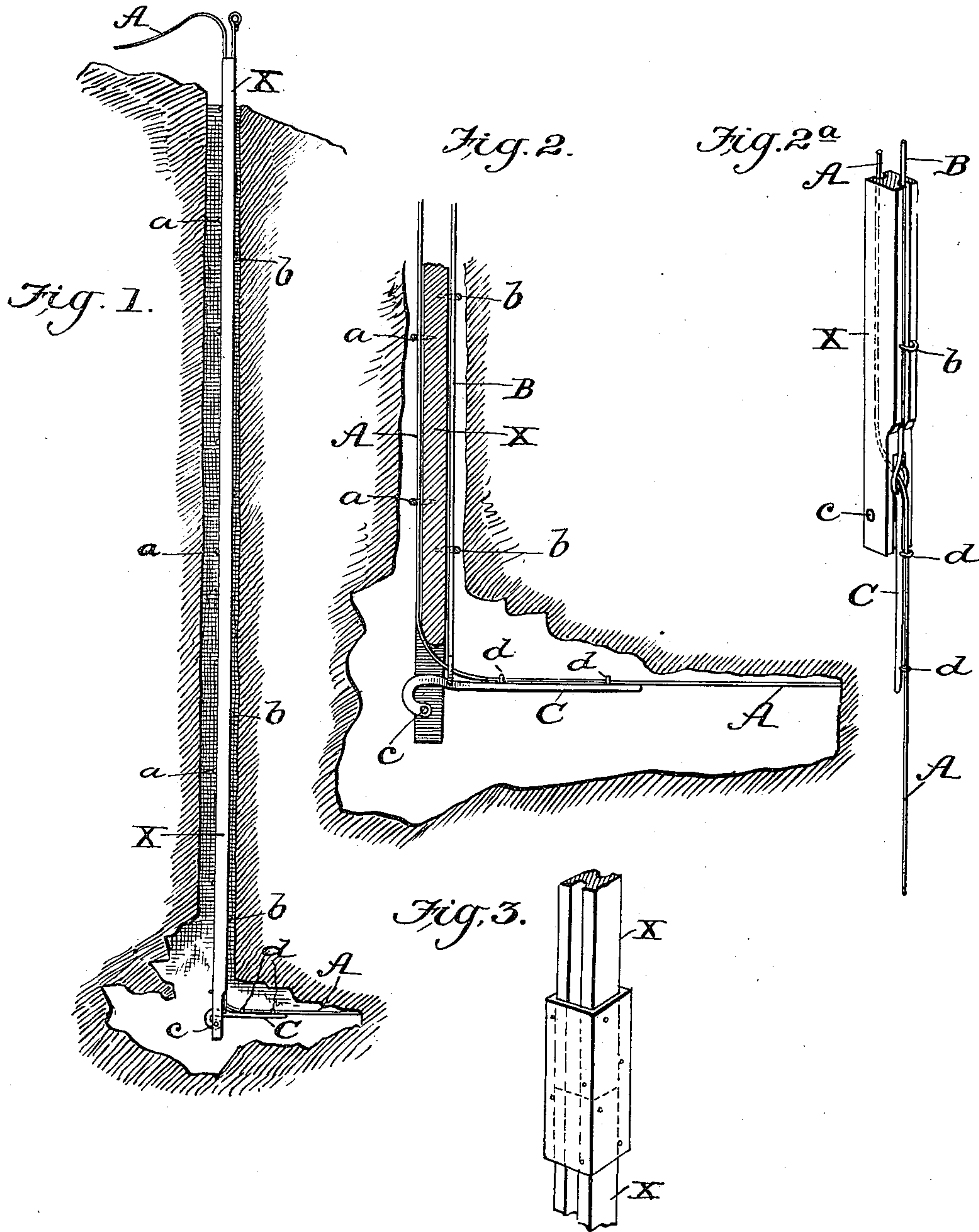
No. 667,516.

Patented Feb. 5, 1901.

W. GIBBONEY, JR.  
TESTER FOR BLAST CAVITIES.

(Application filed Nov. 23, 1900.)

(No Model.)



WITNESSES:

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# UNITED STATES PATENT OFFICE.

WILLIAM GIBBONEY, JR., OF BANE, VIRGINIA.

## TESTER FOR BLAST-CAVITIES.

SPECIFICATION forming part of Letters Patent No. 667,516, dated February 5, 1901.

Application filed November 23, 1900. Serial No. 37,523. (No model.)

*To all whom it may concern:*

Be it known that I, WILLIAM GIBBONEY, Jr., of Bane, in the county of Giles and State of Virginia, have invented a new and useful Improvement in Testers for Blast-Cavities; of which the following is a specification.

In blasting rock for railroad and other construction it is customary to drill holes from ten to forty feet deep and then to enlarge the bottom end of the hole by exploding a dynamite cartridge to form a cavity large enough to receive from five to fifteen kegs of powder to shatter, lift, and displace the rock preparatory to its removal. The enlarging of the lower end of such drilled hole is called "springing the hole," and it is attended with many difficulties and uncertainties, for the reason that such preliminary cavity is inaccessible and it is impossible to ascertain whether the cavity is large enough, in which case it will not hold a sufficient quantity of powder to produce the desired result, or whether it is too large, in which case it will receive too much powder, or an average amount of powder spends itself in the excessively large cavity without producing the requisite shattering effect on the rock. My invention is designed to provide a tester for ascertaining the size of such preliminary blast-cavity, so that if not large enough it may be enlarged by additional cartridges of dynamite, or if already larger than usual it may be sufficiently filled with powder to produce the proper lifting and dislodging effect on the rock without waste of powder.

My invention consists in the construction and arrangement of the testing device for ascertaining the size of the cavity at the bottom of the drilled hole before inserting the powder, as will be hereinafter fully described, with reference to the drawings, in which—

Figure 1 is a vertical section through a rock profile, showing the testing device in place. Fig. 2 is an enlarged sectional detail of the lower end of the tester in the hole. Fig. 2<sup>a</sup> is a similar view showing the folded position for inserting and removing the tester, and Fig. 3 is a detail of a joint of the rod when made in sections for deeply-drilled holes.

In the drawings, X represents a long rod of sufficient size, length, and stiffness to be passed down the drilled hole. This rod is grooved on its opposite sides to give passage

to two wires. One of these, A, passes down in the groove on one side of the rod and is guided in a series of eyes or keepers *a* on the rod and is preferably made of a flat steel spring-wire, or it may be flattened only at its lower end. At the bottom of the rod X there is pivoted at *c* in a slot in the lower end of the rod an angular guide-arm C, made lightly and stiffly of metal and having a crook or turn at its pivoted end and bearing along its upper surface a set or series of guide-keepers *d*, through which the wire A passes and by which it is guided after it turns into a horizontal position. In the longitudinal groove on the opposite side of the rod X there is arranged another wire B, which is also guided in eyes or keepers *b*. This wire is attached to the arm C at one side of the pivot *c*, and the purpose of this wire is to pull up the arm C to a position at right angles to the rod X in order to allow the wire A to be diverted and projected out to the bounds of the cavity, as hereinafter described.

In making use of my invention the tester is inserted through the drilled hole with the arm C in alinement with or parallel to the main rod X, as in Fig. 2<sup>a</sup>. After the bottom of the hole is reached a pull upon the wire B draws up the arm C to a right-angular position, and the wire A is then forced down, and it passes through the several guides on rod X and making the turn at the bottom passes horizontally through the guides *d d* along the top of the horizontally-extended arm and continues to be extended in this direction until it strikes the wall of the blasted cavity. The wire A is then fixed and held by any suitable means so that it will not slip back, and the rod X is pulled out of the hole. As it comes out the arm C folds downwardly as it passes up the narrow hole, and when it reaches the top the distance from the end of the wire A to the rod X indicates the horizontal measurement of the cavity on that side. By inserting the rod again with its arm C turned around to the other side the measurement of the cavity may be ascertained on the opposite side, and so on all around, or the exact length of the wire A being known the various measurements of the cavity in different radiating directions may be ascertained without ever taking the



rod out by simply observing the amount of wire A projecting at the top of the rod when the lower end of the wire comes in contact with the wall of the cavity.

5 The object in having the end of arm C bent is to cause the attaching-point of wire B to be at one side of the pivot *c* when the arm is straight or parallel, so that the pull of wire B will not come on a dead-center.

10 For shallow holes of ten to twenty feet the rod X may be made in a single piece; but where deep holes of thirty to forty feet are drilled the rod X is to be made in sections and united either by screw-joints or by splice-joints, as seen in Fig. 3.

15 By means of this device the engineer knows exactly what he is doing, instead of having to guess at the amount of powder required, and there is a great saving of loss in powder and also in time.

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

25 1. A tester for subterranean cavities at the bottom of a drilled hole, comprising a stiff rod, a flexible wire or strip arranged in guides along the length of the rod, and means for

diverting and guiding the wire laterally from the lower end of the rod substantially as described.

2. A tester for subterranean cavities at the bottom of a drilled hole, comprising a stiff rod, a flexible wire or strip arranged in guides along the length of the rod, an arm jointed to the lower end of the rod and having guides for the said wire or strip, and a second wire attached to the arm and arranged in guides along the rod to move the arm on its joint to or from an angular position substantially as described.

3. The combination of a rod having longitudinal grooves on its opposite sides with guides therein, wires arranged in said grooves and guides, an arm having a crooked or bent end, and jointed to the rod at its crooked end, said arm having guides along its length for one wire, and having the other wire fastened to it at one side of its jointed center substantially as described.

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