(No Model.)

G. A. SAUNDERS.

MACHINE FOR TESTING THE WATER PROOF QUALITY OF FUSES FOR BLASTING.

No. 372,491. Patented Nov. 1, 1887.

Fig. 3.

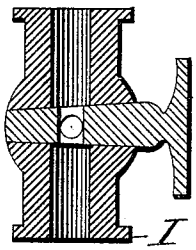


Fig. 4.

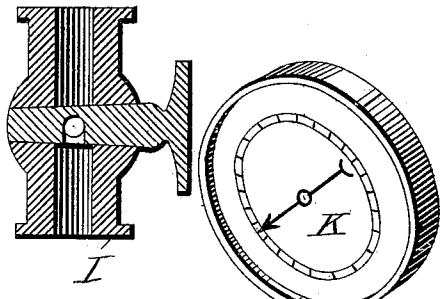


Fig. 5.

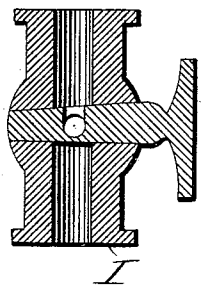


Fig. 1.

Fig. 2.

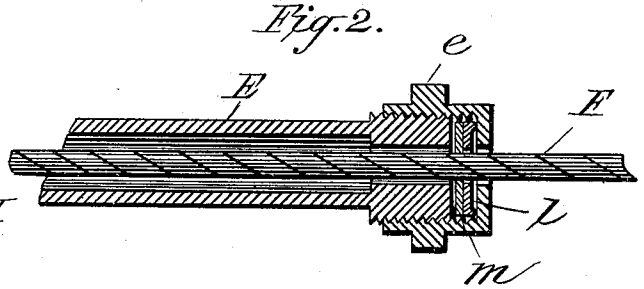
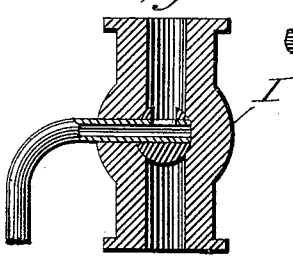


Fig. 6.



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UNITED STATES PATENT OFFICE.

GEORGE A. SAUNDERS, OF AVON, CONNECTICUT, ASSIGNOR TO THE CLIMAX FUSE COMPANY, OF SAME PLACE.

MACHINE FOR TESTING THE WATER-PROOF QUALITY OF FUSES FOR BLASTING.

SPECIFICATION forming part of Letters Patent No. 372,491, dated November 1, 1887.

Application filed November 13, 1885. Serial No. 182,680. (No model.)

To all whom it may concern:

Be it known that I, GEORGE A. SAUNDERS, of Avon, Hartford county, Connecticut, have invented a Machine for Testing the Water-Proof Quality of Fuses for Blasting and other Purposes, of which the following is a full, clear, and exact specification, reference being had to the accompanying drawings.

The object of my invention is to provide an apparatus for subjecting water-proof-coated safety-fuse to hydraulic pressure, to approximate to the conditions to which it will be exposed in actual service in submarine and underground operations, and thereby discover any flaws or defects in the water-proof coating. The machine herein described is also to be used in testing or comparing the relative merits of two pieces of fuse of different make or different portions of the same fuse. I accomplish these results by constructing a device in which two tubes provided with metallic and with rubber washers and compression caps or nuts at each end are in communication with a pump-barrel and a pressure-gage. My machine for this purpose consists of two or more tubes, in which the pieces of fuse to be tested are placed, a pressure-gage, and a force-pump and regulating-cocks. The ends of the tubes are provided with rubber washers, metallic washers having a raised ring on one side, and compression caps or nuts perforated for the insertion of the tubes. These compression caps or nuts can be screwed firmly against the metallic washers, which are also each perforated with a hole a trifle larger than the diameter of the fuse. Inside the metallic washers are rubber washers, likewise perforated, the action of the screw-cap being to compress the rubber and force it tightly against the fuse, forming a water-tight joint. The metallic washers above referred to are smooth next the rubber washers, but have on their outer faces, next the caps, small raised rings, against which the caps bear and can turn without causing the washers to turn with them, thus avoiding friction against the fuse and consequent injury to the coating. The gage enables the operator to determine the exact pressure to which the fuse is exposed at any time, and by the constant or diminishing pressure indicated to determine whether the coating is yielding or not. By this combination the character of the fuse can be ascertained without removal from the machine—an important matter, for the conditions are quite unlike electrical cable-testing, in which the insulation of the wires is shown by simply passing a current through them and watching a galvanometer-needle. The arrangement of the pipes, valves, and pump is also devised to effect rapid work.

In the drawings, Figure 1 is a perspective view of my device, showing a fuse in place in one of the tubes. Fig. 2 is a longitudinal section of one of these tubes. A fuse is shown in place. Figs. 3, 4, 5, and 6 are sectional views of the four-way cock, and Fig. 7 is a section to illustrate the screw-cap of the pump.

A is a simple force-pump of usual construction, having a piston-rod, *b*, handle B, and suction-pipe C.

D and E are tubes connected with the pump-barrel and with a pressure-gage, K, of any usual construction.

H is the pipe connecting the tubes D and E with the gage K. The flow through this pipe is controlled by a four-way cock, I, which has the tube *h* attached.

a is a screw-cap upon the pump.

e e are compression screw-caps upon the fuse-tubes D and E.

m are the rubber washers; I, metallic washers provided with a small raised ring, as shown; F, the fuse to be tested.

The force-pump is of any usual construction.

The pressure-gage is of the kind usually employed to indicate water-pressure.

The plug of the cock I has two holes—one directly through it and the other abutting against the first at right angles. The fuse-tubes are simply brass pipes larger in internal diameter than the diameter of the fuse, and having thickened ends which are threaded, and have screw-caps with holes which are a trifle larger than the fuse. Rubber packing-rings or washers *m* are placed against the ends of the pipe, and between these washers and the inside of the cap are placed the metallic washers I.

The operation is as follows: The pieces of fuse to be tested are placed in the tubes D and

E, the ends projecting through the holes in the compression-caps, which are then screwed up, firmly compressing the india-rubber washers until, having no other escape, they press tightly against the outside of the pieces of fuse and make a perfectly water-proof joint. The suction-pipe C is placed where it can get water, and the handle B of the pump A is drawn back and forth, forcing water, under pressure, into the tubes D and E and into the pressure-gage K, if the stop-cock is correctly placed. If the waterproofing of the fuse is good, the pressure as indicated by the gage will remain almost constant; but if the coating is imperfect the water will be forced through it and enter the substance of the fuse, letting the pressure fall rapidly. To let off the water the stop-cock is turned so as to open communication between the gage, the pump, and the waste-pipe *h*. The screw-caps are then loosened and the fuse removed. When two or more pieces of fuse are tested at once, the relative merits of different brands can be compared under precisely the same conditions. For this purpose the use of the pressure-gage, though not absolutely necessary, is preferable.

If but a single piece of fuse is to be tested, solid washers should be placed at the end of the testing-tube which is not in use. It is advisable, however, to test two pieces at once, as in this way an average can be taken of the number of hours which each resists the water-pressure.

Having now fully described my invention, what I claim, and desire to secure by Letters Patent, is—

1. The combination of two or more testing-tubes provided with perforated caps and washers with a force-pump, a suction-tube, and a pressure-gage, all constructed and operating substantially as described.

2. A machine for the hydraulic testing of blasting-fuse, comprising two tubes, each provided with perforated caps, perforated rubber washers, and perforated metallic washers having a raised ring, as described, a force-pump, and a pressure-gage, all constructed and operating substantially as described.

In witness whereof I have hereunto set my hand.

GEORGE A. SAUNDERS.

Witnesses:
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A. F. ANDREWS.