No. 697,774. Patented Apr. 15, 1902.

W. T. ARMSTRONG.

APPARATUS FOR ASSAYING ORES.

(Application filed Jan. 20, 1902.)

(No Model.)

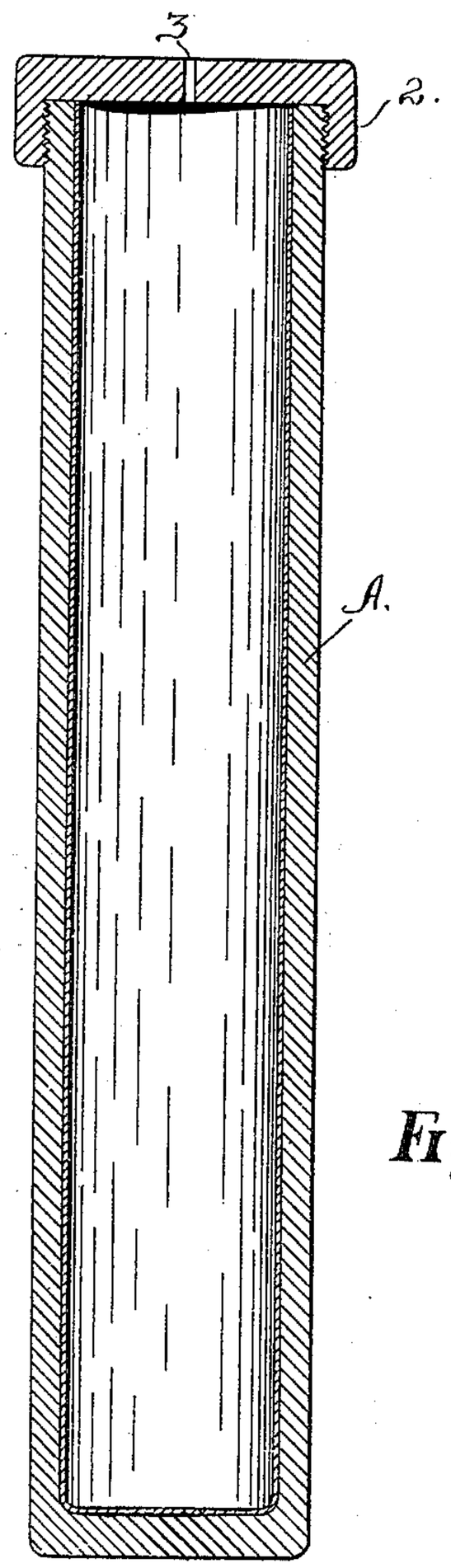

Fig. 1.

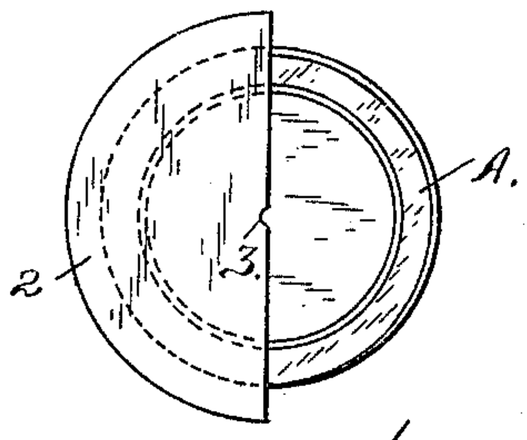

Fig. 2.

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UNITED STATES PATENT OFFICE.

WILLIAM T. ARMSTRONG, OF SAN JOSE, CALIFORNIA.

APPARATUS FOR ASSAYING ORES.

SPECIFICATION forming part of Letters Patent No. 697,774, dated April 15, 1902.

Application filed January 20, 1902. Serial No. 90,461. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM T. ARMSTRONG, a citizen of the United States, residing at San Jose, county of Santa Clara, State of California, have invented an Improvement in Apparatus for Assaying Ores; and I hereby declare the following to be a full, clear, and exact description of the same.

My invention relates to improvements in devices for determining the proportion of metals contained in their ores. Its object is to provide a simple, compact, portable assaying outfit capable of being carried in the pocket, but which will serve all the purposes of the miner or prospector, who may often be hundreds of miles from an assay-office.

My invention consists of a tubular receptacle of iron or other suitable material closed at one end and provided with a removable perforated cap at the other, an envelop in which the ore to be treated is placed, said envelop adapted to be inserted into the tube and to keep the ore contents out of contact with said tube during the process of reduction. This envelop or cupel is preferably of paper or other fiber which has the quality of forming a carbonaceous lining within the tube or furnace.

The details of my invention will be set forth more fully hereinafter, having reference to the accompanying drawings, in which—

Figure 1 is a central longitudinal section of tube. Fig. 2 is a partial top view of cap and tube.

A represents a tube of suitable size and material. I prefer a piece of two-inch iron pipe about ten inches long, having one end permanently closed. The other end is provided with a removable cap 2, which may be perforated, as at 3. The ore to be tested is placed in this tube and submitted to a roasting heat, the perforations 3 allowing the escape of any gas that may be generated inside the device. In the case of auriferous ore it is first pulverized to a desired degree of fineness, usually so that it will readily pass through a No. 35 screen. It is then mixed with a suitable reagent, as charcoal and nitrate of potassium, (the ordinary saltpeter or niter of commerce.) The charcoal and niter are previously ground and then mixed in the proportion of two parts of the former to one of the latter. This mixture is used with the comminuted ore in the proportion approximately of eight ounces of the latter to two ounces of the former.

It is necessary that in the process of roasting the ore and chemicals should not come in contact with either the fire, the atmosphere, or the iron. Accordingly I make an envelop or cupel of heavy paper or other suitable fibrous material which has the quality of charring without being destroyed during the process of roasting and which forms a suitable lining for the "tube" or "furnace," as it may be called, and prevents the molten product from adhering to the iron. I take a piece of heavy paper and roll it into the form of a tube, sealing one end and adapting it to fit easily within the tube or cylinder A. In operation a mixture of ore, charcoal, and niter is placed in this paper tube and the latter inserted into the cylinder A and the cap screwed on. The device thus charged is ready for the fire. The latter may be that of an ordinary stove, or an open fire built at any convenient spot on the ledge will serve the purpose. It is necessary to have the tube A completely covered by the fire, so that all air will be excluded from contact with the ore and that roasting may be properly effected. When reduction is completed, the device is taken out, cooled, and the contents removed in the form of "matte." By well-known means the gold is easily separated from the baser ingredients of the matte. I have found the following means well adapted for the use of the prospector, for whose benefit my device is particularly intended: The matte is pulverized and put in a pan with a little water and a small quantity of sulfate of iron. Quicksilver is then added and the resulting amalgam washed and placed in a test-tube with dilute nitric acid. The tube is held over a flame till the contents boil, whereupon the quicksilver is dissolved. The liquid is then poured off, the tube filled with soft water, and the solid residuum is a small "button" in the bottom of the tube.

The tube A may also serve the purpose of a mortar by simply removing the cap 2 and using an ordinary drill for a pestle.

When not in use, the test-tube, cartridge, and chemicals may be contained in the tube A. Thus the miner has a cheap, compact, portable outfit which weighs but little and which permits him to determine accurately as he goes along the character of the ore he is handling.

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

1. The combination in an apparatus for assaying ores, of a receptacle having a suitable closure, and an ore-containing envelop or cupel of fibrous material adapted to be inserted into said receptacle whereby the ore is prevented from coming in contact with the sides of said receptacle during the process of reduction.

2. The combination in an apparatus for assaying ores, of a tubular receptacle having a removable closure, and an ore-containing envelop or cupel of carbonaceous material adapted to be inserted into said receptacle.

3. The combination in an apparatus for assaying ores, of a tubular structure of heat-resisting material, closed at one end and having a perforated removable cover or cap on the other end, and an ore-containing receptacle or cupel adapted to telescope within said tubular structure.

4. In an apparatus for assaying ores, the combination of a tube having one end closed and a removable perforated cap fitting the other end of the tube, said tube having a lining of material which carbonizes during reduction.

In witness whereof I have hereunto set my hand December 24, 1901.

WILLIAM T. ARMSTRONG.

Witnesses:
H. H. FOLSOM,
JOHN MUNDAY.