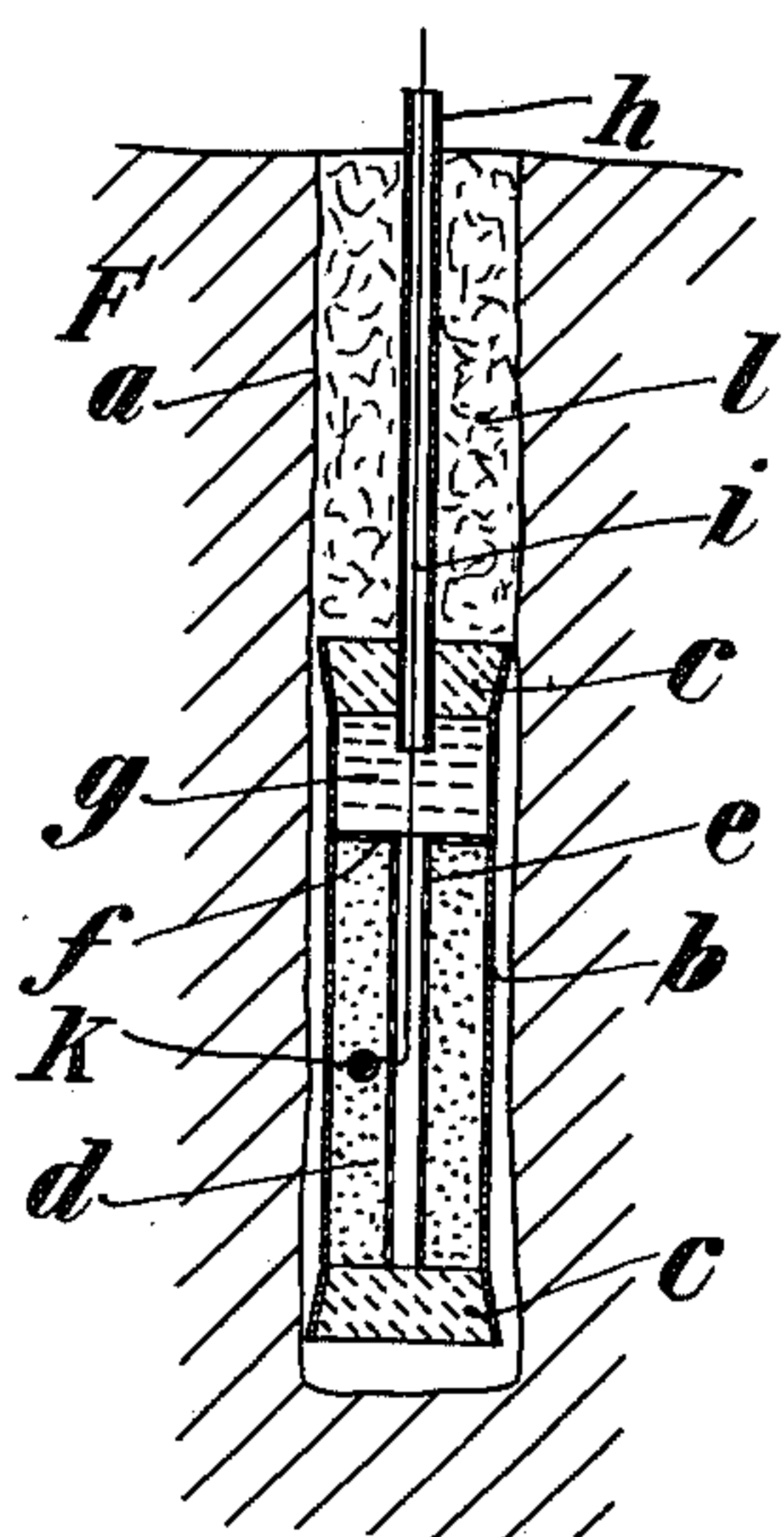


P. HEYLANDT.  
BLASTING CARTRIDGE.  
APPLICATION FILED MAR. 25, 1915.

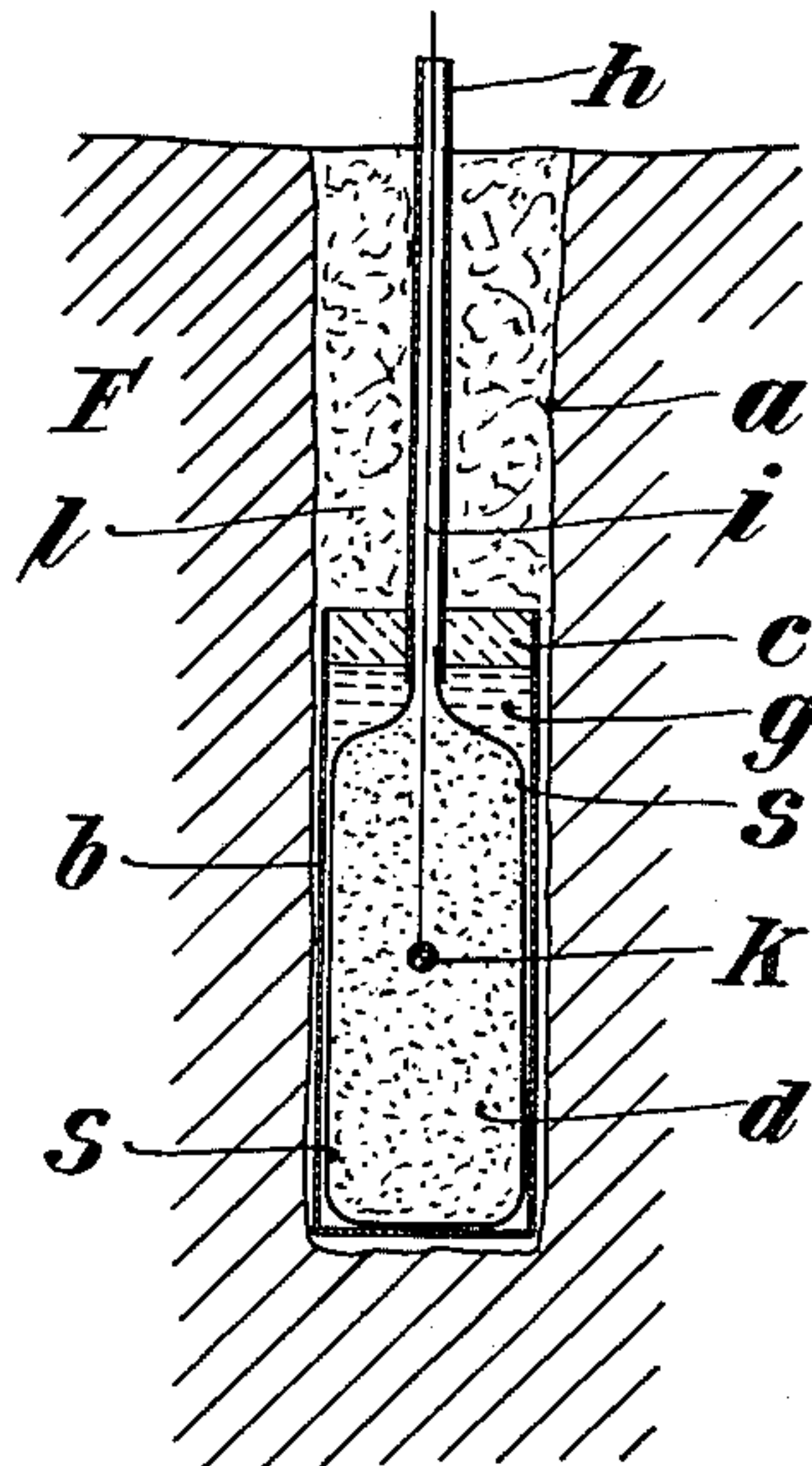
1,154,770.

Patented Sept. 28, 1915.

*Fig. 1.*



*Fig. 2.*



INVENTOR:

Paul Heylandt  
BY *M. M. Mullen*  
ATTY

## UNITED STATES PATENT OFFICE.

PAUL HEYLANDT, OF BERLIN, GERMANY, ASSIGNOR TO FIRM MASCHINEN- UND APPARATE-FABRIK A. R. AHRENDT & CO., OF BERLIN, GERMANY.

## BLASTING-CARTRIDGE.

1,154,770.

Specification of Letters Patent.

Patented Sept. 28, 1915.

Application filed March 25, 1915. Serial No. 16,928.

*To all whom it may concern:*

Be it known that I, PAUL HEYLANDT, a citizen of the German Empire, and residing at Berlin, Germany, have invented certain new and useful Improvements in Blasting-Cartridges, of which the following is a specification.

The subject-matter of this invention is an improved cartridge, ready for discharge, for blasting rock and the like by means of liquid air, liquid oxygen or the like.

The improved cartridge, which contains powdered carbon and is charged with liquid air, liquid oxygen or the like before being inserted into the blast hole, differs from known devices for similar purposes in that it is provided, before its insertion into the blast hole, with a sieve, coarse fabric, fine perforations or other means for allowing the liquid gas to gradually saturate the powdered carbon, the time required by the liquid gas to saturate the carbon being such that the blast hole can be properly tamped.

In contradistinction to known cartridges in which liquid gases are used, the powdered carbon in the improved cartridge is severely cooled and saturated by the liquid gas, whereby the advantage is obtained that the size of the chamber or space provided for the liquid gas in the cartridge requires to be only a small fraction of that in known cartridges in which the liquid air can enter into the holder of the carbon only after the cartridge has been introduced into the blast hole and in some cases after an air vessel has been broken. Besides this advantage the improved cartridge has the additional advantages of the diameter of the blast hole being diminished, and the time required for making the blast hole and, consequently, the cost of the same being reduced, apart from the supply of liquid air required being diminished.

Some illustrative embodiments of the invention are represented by way of example in the accompanying drawing, wherein:—

Figure 1 is a vertical section showing one form of the improved cartridge, and Fig. 2 is a like view showing another form.

Referring firstly to Fig. 1, the rock F is provided with the blast hole *a* into which is introduced the cartridge comprising the tubular case *b* of stiff paper closed at each end by a stopper *c*. This case contains the

charge *e* composed of sacking provided with a carboniferous body, *e. g.* powdered carbon or the like, and on the top of the charge is liquid air or liquid oxygen *g*. A duct *h* extends from in front of the blast hole into the cartridge and contains the fuse *i* leading to the igniter *k*.

Fig. 2 shows a preferred form of the improved live cartridge, in which the cartridge case *b'* contains a small bag *s* of predetermined size containing the carbon *d*. In this form the liquid gas *g* surrounds the bag *s* on all sides, and the cartridge case is closed by a stopper *c* at only one end.

*l* denotes the tamping in the blast hole *a*.

It will be readily understood that any desired number of the hereindescribed cartridges can be made before their introduction into blast holes.

In order to blast with the improved cartridges it suffices merely to bore the requisite number of blast holes and to insert the previously prepared cartridges into them, whereupon the cartridges can be simultaneously ignited by means of a fuse.

The improved cartridges are particularly adapted for blasting under water.

I claim:—

1. In a live cartridge of the character described, a cartridge case, a pervious member dividing the case into two chambers, a charge of carboniferous material in one of said chambers, and a liquid oxygenous gas charge positioned in the other chamber and adapted to seep through the pervious member into contact with the first mentioned charge.

2. In a live cartridge of the character described, a cartridge case constructed of substantially non-heat-conducting material, a pervious member dividing the case into two chambers, a charge of carboniferous material in one of said chambers, and a liquid oxygenous gas charge positioned in the other chamber and adapted to subject the carboniferous charge to severe cold and then to seep through the pervious member into contact with the same.

3. In a live cartridge of the character described, a cartridge case, a pervious member dividing the case into two chambers, a charge of comminuted carboniferous material in one of said chambers, and a liquid oxygenous gas charge positioned in the other



chamber and adapted to seep through the pervious member into contact with the first mentioned charge.

4. In a live cartridge of the character described, a cartridge case, a pervious member dividing the case into upper and lower chambers, a charge of carboniferous material in the lower chamber, and a liquid oxygenous gas charge positioned above the first mentioned charge in the upper chamber.

5. In a live cartridge of the character described, a cartridge case, a bag of pervious material mounted within the case, a charge of carboniferous material in said bag, and a charge of liquid oxygenous gas positioned within the case in contact with the bag and adapted to seep through the latter.

6. In a live cartridge of the character described, a cartridge case, a pervious member dividing the case into two chambers, a 20 charge of carboniferous material in one of said chambers, a liquid oxygenous gas charge positioned in the other chamber and adapted to seep through the pervious member into contact with the first mentioned 25 charge, and means for detonating the cartridge.

In testimony whereof, I affix my signature in the presence of two witnesses.

PAUL HEYLANDT.

Witnesses:

HENRY HASPER,  
WOLDEMAR HAUPT.