(No Model.)

# G. M. GITHENS.

## METHOD OF BLASTING ROCK.

No. 512,816. Patented Jan. 16, 1894.

Fig. 2.

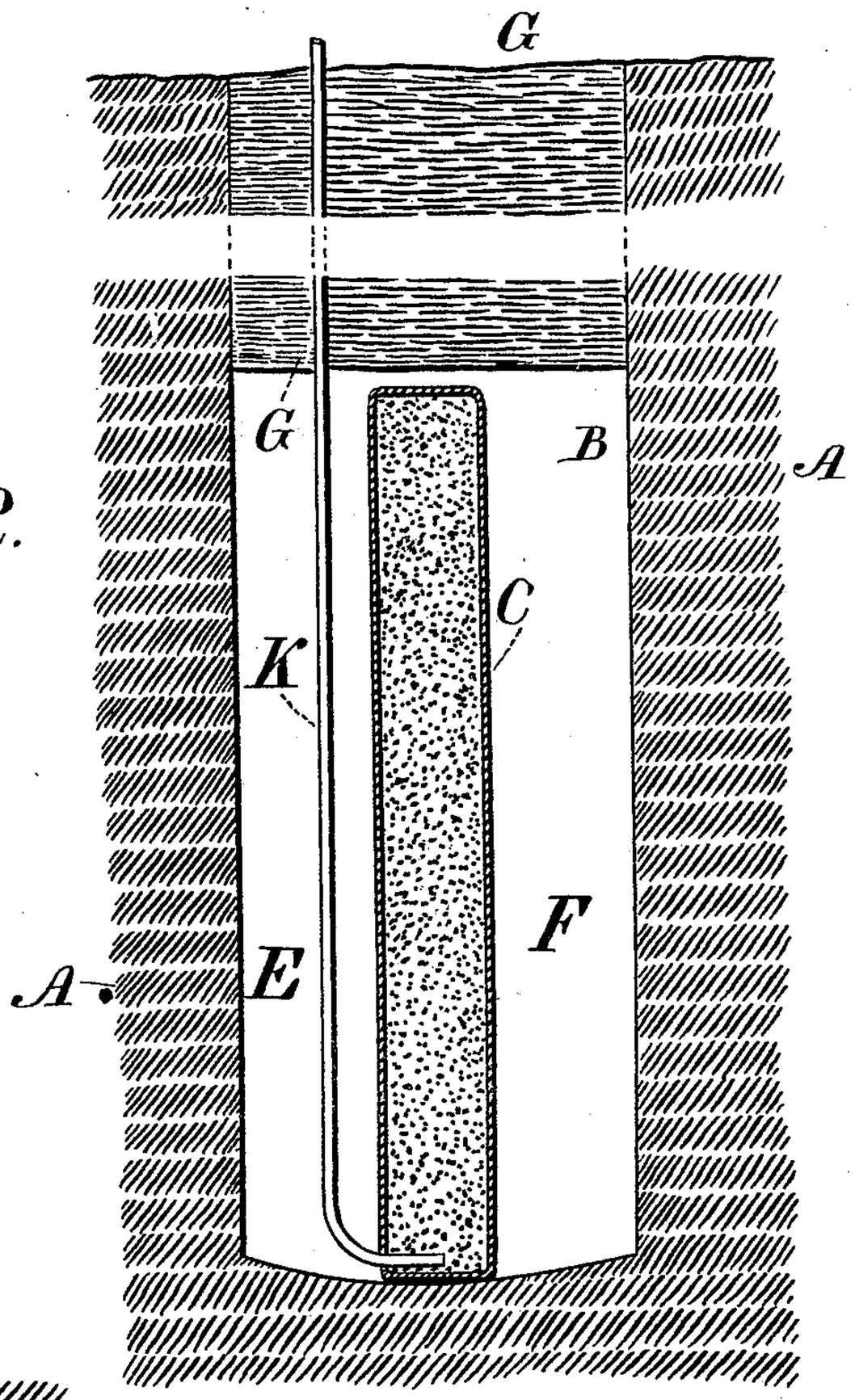



Fig. 3.

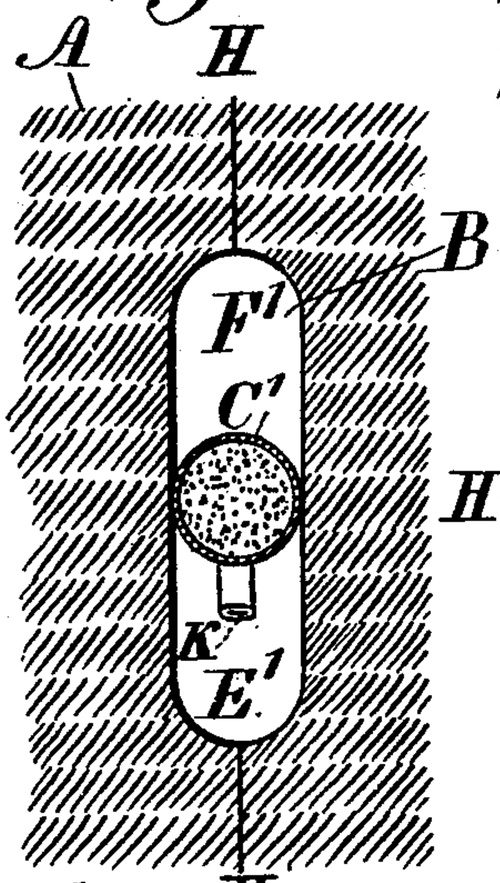
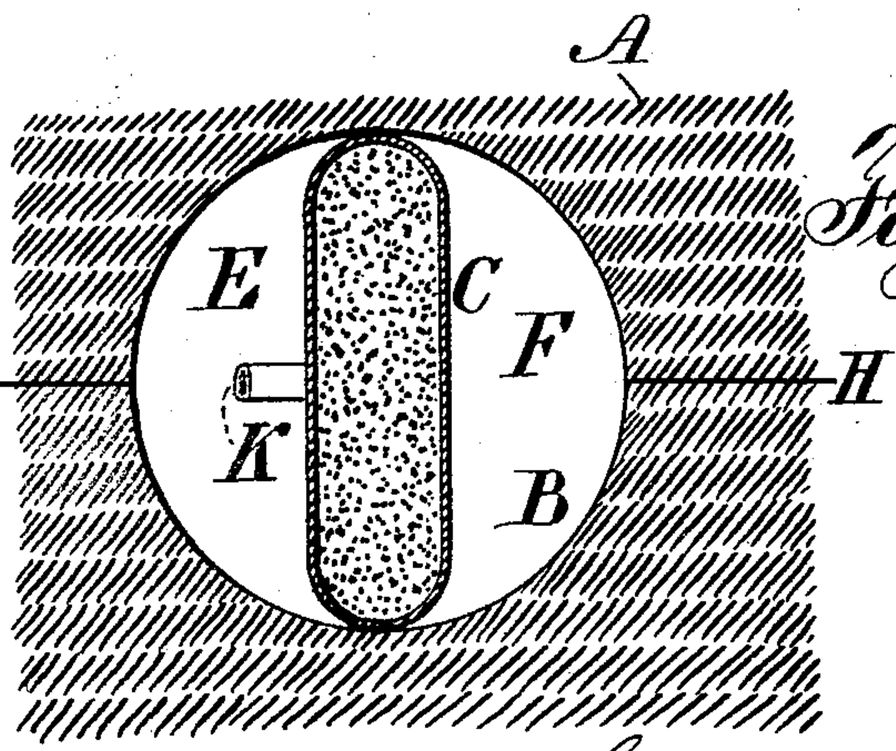



Fig. 1.

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# UNITED STATES PATENT OFFICE.

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## METHOD OF BLASTING ROCK.

SPECIFICATION forming part of Letters Patent No. 512,816, dated January 16, 1894.

Application filed March 11, 1893. Serial No. 465,506. (No model.)

*To all whom it may concern:*

Be it known that I, GEORGE M. GITHENS, a citizen of the United States, residing at Brooklyn, in the county of Kings and State of New York, have invented an Improvement in Methods of Blasting Rock, of which the following is a specification.

Before my invention blast holes had been drilled in stone to the desired depth and a charge of explosive material introduced into the bottom of the hole and an expansion air chamber left between the blast and the tamping, so that when the charge was fired the gases would expand into the space above the explosive material and Increase the area of pressure and cause the rock to be split in the desired manner. This mode of blasting has been made use of in cylindrical holes as well as in holes channeled on their opposite surfaces. In this mode of blasting difficulty has been experienced, especially when blasting sandstone, marble or similar materials that are comparatively soft. This difficulty has been two-fold: first, the intensity of the explosion has injured, by disintegration, the stone immediately adjacent to the blast, and when the blast is exploded the expansion of the gases is upwardly toward the tamping and the accumulation of pressure commences against the under side of the tamping; hence the rock is split at two points almost simultaneously; that is to say, it is split immediately adjacent to the explosion and immediately adjacent to the under side of the tamping, and these two cracks do not always run together but frequently are at an angle to each other and extend past each other; hence the stone between the two cracks is valueless.

The object of my present invention is to insure the cleaving of the stone in the proper direction and to prevent the formation of two cracks, so that only one line of cleavage is started and continued by the expansive action of the gases generated in the explosion. With this object in view I drill the rock in any ordinary manner, either with a circular hole or channeled along one or more of its surfaces, or else the rock is drilled with an elliptical or other shaped hole, as represented in my Patents Nos. 371,679 and 486,101, as my improvements are not limited to any particular shape of hole. I make use of a canister or powder holder that is comparatively long and thin and of a width corresponding or nearly so to the interior diameter of the hole, and in consequence of this shape of powder holder the explosive material is caused to occupy a greater length or distance in the blast hole, and in addition to this, expansive air chambers are left within the hole at each side of the powder holder or canister. The consequence of this construction is that when the explosive material is fired the line of cleavage is perpendicular or nearly so to the plane of the longest diameter of the cartridge case; that is to say, when the explosion occurs the gases do not act as powerfully upon the surfaces of the stone that are close to the canister as they do upon the surfaces of the stone at the more distant places in the air chamber at the opposite sides of the powder canister.

In the drawings I have represented in Figure 1 a sectional plan view of the canister with the adjacent air chambers, and in Fig. 2 I have represented a longitudinal section of the rock and a transverse longitudinal section of the powder holder, and Fig. 3 shows my improvement with a hole that is of greater diameter in one direction than the other.

A represents the rock or stone to be split, B the hole therein which may be of any desired shape, and C the canister or powder holder which is flat and thin, the greater diameter of the powder holder corresponding or nearly so to the interior diameter of the bore in the rock, so that there are expansive air chambers E and F, one at each side of the powder holder or canister, and the tamping G is to extend down to the upper end of the powder holder or nearly so, and the powder may be fired in any desired manner. I however usually prefer to employ a fuse K passing down through one of the air chambers so as to commence the explosion of the powder or similar material at the bottom end of the charge. I find that the line of cleavage is at right angles to a plane passing through the longer diameter of the powder holding case, namely upon the line H, and this appears to arise in consequence of the powder holding

case being disrupted nearly in the line H, and the force of the explosion accumulating and concentrating upon the line H or nearly so; hence the crack in the rock will be a single crack commencing at one end or the other of the air chambers and extending from the point of commencement so that the rock is split without the defects heretofore inseparable from the formation of the two cracks at each side of the blast hole, and much less stone is wasted by my improvement than when the charge is fired in the modes heretofore usual.

I am aware that cartridge cases have been made elliptical, but when the same are introduced in the blast hole, sand or similar tamping material has been poured in to fill the spaces between the cartridge case and the rock, and in this instance there is no expansive chamber for the gases, and the line of cleavage of the rock is uncertain, but it usually takes place in a plane passing through the longer diameter of the elliptical cartridge case.

In cases where the blast hole is longer in one direction than the other, as in my Patent No. 486,101, the cartridge case may be cylindrical, as shown in Fig. 3. The air chambers E′ F′ at opposite sides of said cartridge C′ act in the manner before described and the line of cleavage is at H.

I claim as my invention—

1. The method herein specified of blasting rock, consisting in drilling a hole in the rock and introducing thereinto the explosive material in a case or holder that is flat and comparatively thin, such case or holder corresponding or nearly so in its width to the diameter of the blast hole, so as to leave expansive air chambers at each side of the cartridge, whereby the action of a given charge of powder is distributed over a greater length in the blast hole and the line of cleavage is determined by the direction that the cartridge stands in relation to the hole, substantially as set forth.

2. The method herein specified of blasting rock, consisting in drilling a hole and introducing thereinto a cartridge having a case that is of a width corresponding or nearly so to the diameter of the hole and sufficiently thin to leave expansive air chambers at each side of such case, and igniting the cartridge at its lower end so as to commence the line of cleavage from the bottom of the hole and in a plane at right angles to the longer diameter of the cartridge case, substantially as set forth.

3. The method herein specified of blasting rock, consisting in drilling a hole in the rock and introducing thereinto a cartridge of such a shape that a longitudinal air chamber is left at each side of the cartridge between the same and the rock and exploding such cartridge, substantially as specified.

Signed by me this 9th day of March, 1893.

GEO. M. GITHENS.

Witnesses:
GEO. T. PINCKNEY,
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