

L. H. BROADWATER.
 APPARATUS FOR FIRING EXPLOSIVES BY PERCUSSION GAPS.
 APPLICATION FILED JUNE 24, 1907.

921,670.

Patented May 18, 1909.

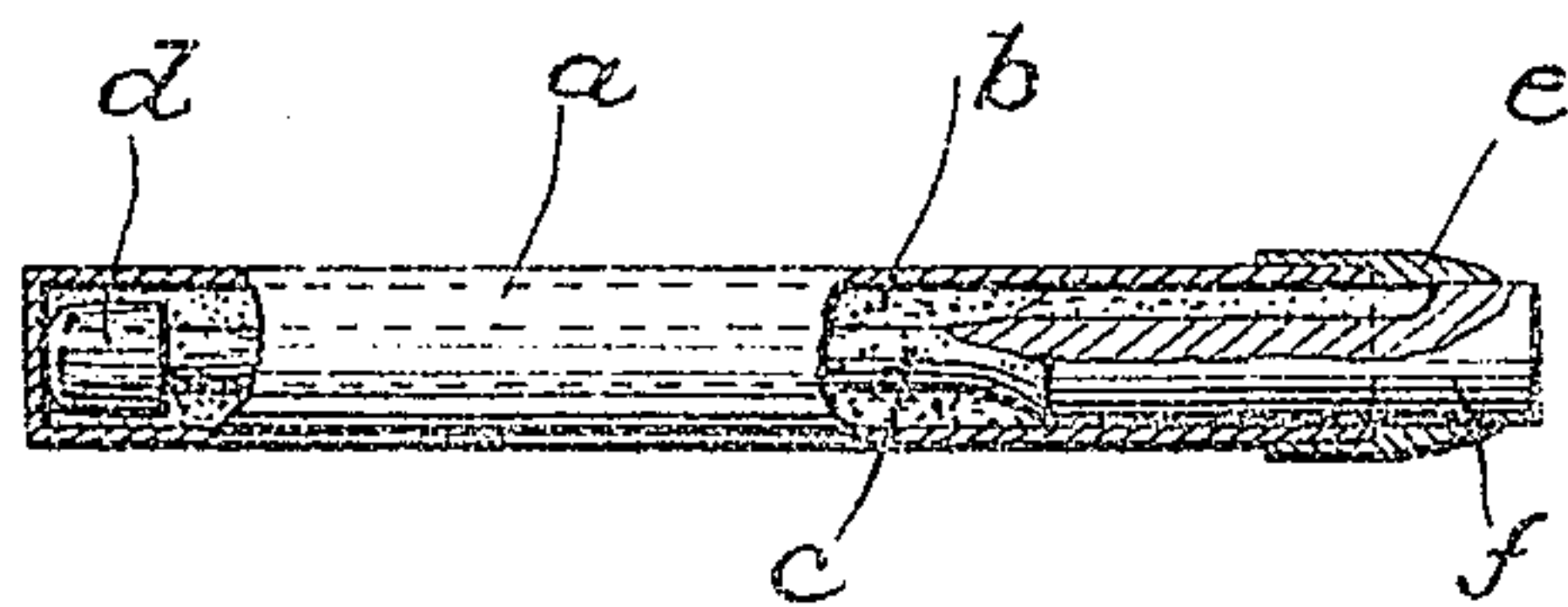


FIG. 1.

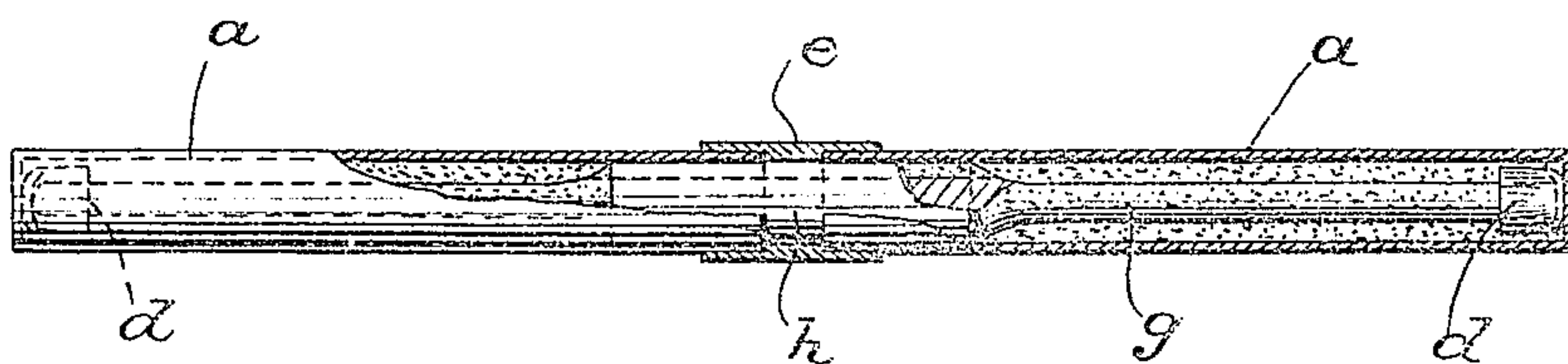


FIG. 2.

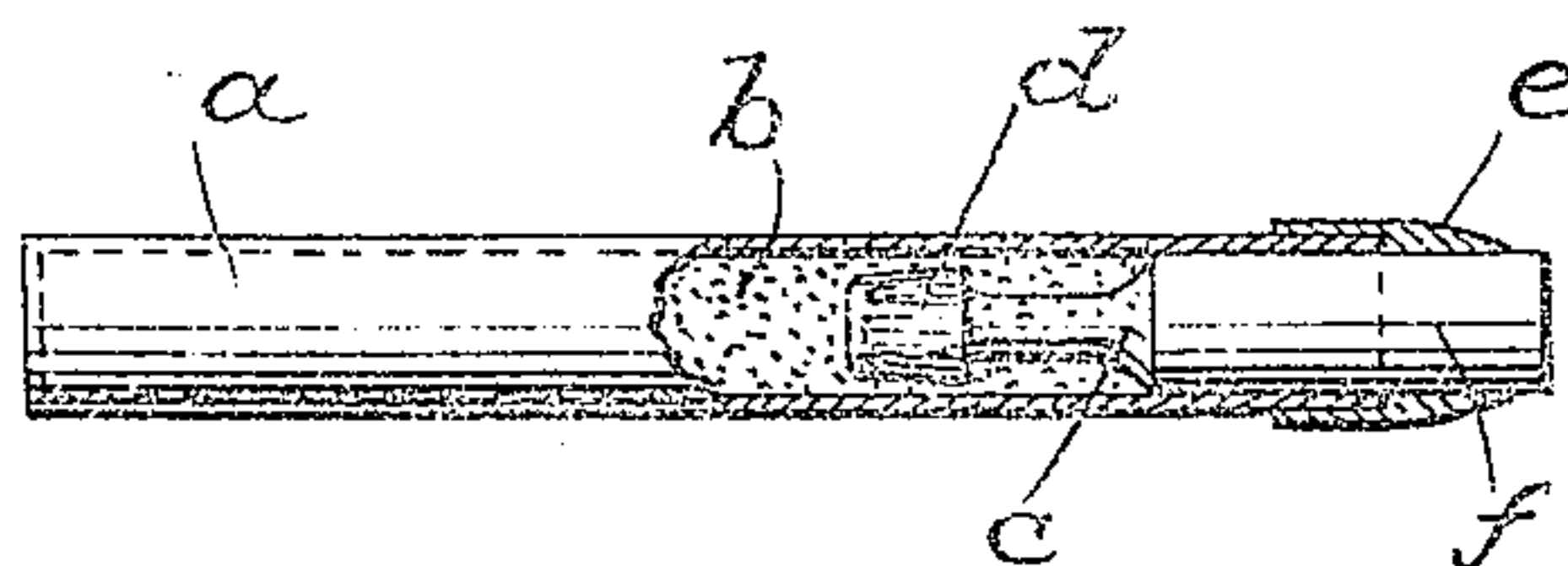


FIG. 3.

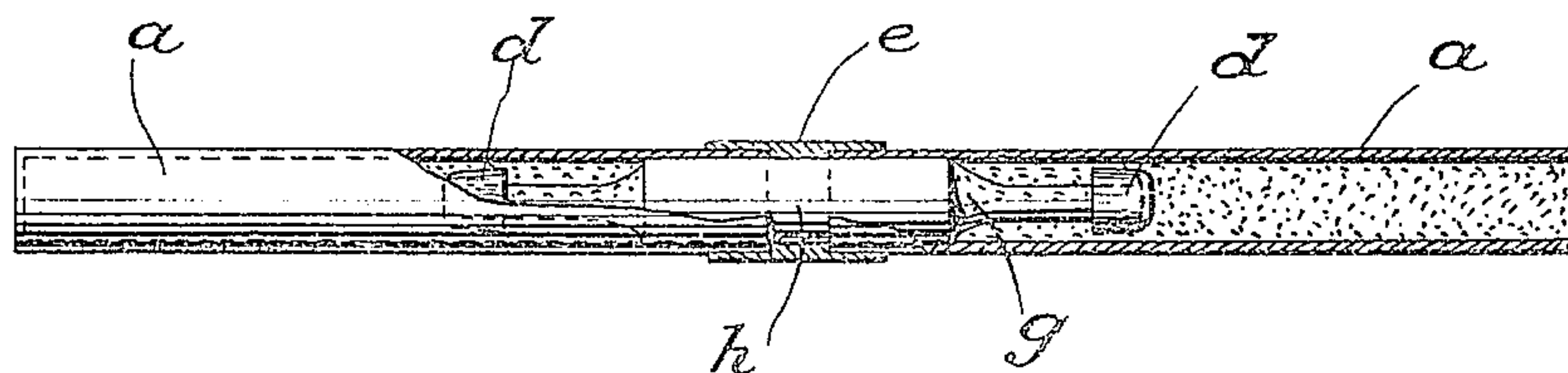


FIG. 4.

WITNESSES:

Robt R. Kitchel

M. M. Hamilton

INVENTOR

Luke H. Broadwater

BY

Wesley R. Standley
 ATTORNEYS.

UNITED STATES PATENT OFFICE.

LUKE H. BROADWATER, OF FINDLAY, OHIO, ASSIGNOR TO THE E. I. DU PONT DE NEMOURS POWDER COMPANY, OF WILMINGTON, DELAWARE, A CORPORATION OF NEW JERSEY.

APPARATUS FOR FIRING EXPLOSIVES BY PERCUSSION-CAPS.

No. 921,670.

Specification of Letters Patent.

Patented May 18, 1909.

Application filed June 24, 1907. Serial No. 380,584.

To all whom it may concern:

Be it known that I, LUKE H. BROADWATER, a citizen of the United States, residing at Findlay, county of Hancock, and State of Ohio, have invented a new and useful Improvement in Apparatus for Firing Explosives by Percussion-Caps, of which the following is a full, clear, and exact description, reference being had to the accompany drawings, which form a part of this specification.

With certain characters of high explosives, such, for instance, as solid nitro-glycerin or explosive gelatin, the ordinary percussion cap alone will not cause them, with certainty, to explode. In the ordinary method, a percussion cap is in contact with the high explosive. This percussion cap has a rod projecting from it, which is called the "start". When this "start" is struck, the cap is exploded, causing the explosion of the high explosive. As stated before, with some classes of high explosives, the cap alone will not cause the explosion.

The object of my invention is to obviate this difficulty. Speaking generally, I accomplish this as follows: I use in addition to the percussion cap, a metallic capsule in which is a solid quick rending explosive, for instance, fulminate of mercury or a mixture of nitro-toluene, aluminium, magnesium and potassium chlorate. In this capsule I insert the percussion cap attached to the "start", as it is called. The cap is in contact with the explosive in the capsule and forms a band for the cap. The cap may rest on the closed end of the capsule, at some intermediate point, or on top of the explosive in the capsule. The "start" projects beyond the open end of the capsule and a portion of said "start" at that end is increased in cross section to that of the interior of the capsule. The capsule may be filled before the insertion of the start and percussion cap, or a notch or opening may be left in the enlarged portion of the "start" by means of which the explosive may be placed in the capsule after the cap has been inserted. The open end of the capsule or the joint between the capsule and "start" is closed with water-proof material, for instance, casein. I can also use two capsules placed open end to open end with a "start" having a percussion cap at each end and an enlarged central portion,—one cap being inserted in one capsule and the other cap in the other capsule. When by a blow upon the "start" one or

both of the caps, as the case may be, is exploded, the fulminate or other solid high explosive is caused to be exploded, which shatters the capsule and insures the explosion of the high explosive main charge.

I will now describe the embodiment of my invention shown in the accompanying drawings and then point out the invention in the claims.

In the drawings: Figure 1 is a sectional view showing a single capsule and cap, the cap resting against the closed end of the capsule. Fig. 2 is a view similar to Fig. 1 with two capsules and two caps. Fig. 3 is a similar view showing cap resting upon the top of the explosive in the capsule. Fig. 4 is a view similar to Fig. 3 with two capsules and two caps.

Speaking of Figs. 1 and 3: *a* is a capsule having the closed end. *b* is the quick high explosive therein. *c* is the "start" having the enlarged portion *f*, *d* the percussion cap at the end thereof and *e* is the water-proof sealing material.

In Figs. 2 and 4, there are two capsules *a* and a "start" *g* having the central enlarged portion *h*. At each end of the "start" is a cap *d* and *e* is the water-proof sealing material closing the joint of the two capsules and the enlarged portion *h* of the "start".

From what has been hereinbefore stated the operation may be clearly understood.

Having now fully described my invention what I claim and desire to protect by Letter Patent is:

1. A device for firing high explosives comprising a capsule containing a "start", a percussion cap carried thereby, and a solid quick rending explosive in said capsule in contact with the cap.

2. In combination, a capsule containing quick rending explosive, a "start", a percussion cap carried thereby, said cap being in contact with said explosive and a water proof sealing for said capsule.

3. In combination, a capsule containing fulminate of mercury, a "start", a percussion cap carried thereby, said cap being in contact with said explosive.

4. In combination, a capsule containing fulminate of mercury, a "start", a percussion cap carried thereby, said cap being in contact with said explosive and a water proof sealing for said capsule.

5. In combination, a capsule containing

quick rending explosive, a "start", a percussion cap carried thereby, said cap being in contact with the explosive, said "start" having an enlarged portion within and extending without said capsule.

6. In combination, a capsule containing a quick rending explosive, a "start", a percussion cap carried thereby, said cap being in contact with the explosive, said "start" having an enlarged portion extending without said capsule, and a water-proof seal between said head and capsule.

7. In combination, a capsule containing a fulminate of mercury, a "start", a percussion cap carried thereby, said cap being in contact with the explosive, said "start" having an enlarged portion extending without said capsule.

8. In combination, a capsule containing a fulminate of mercury, a "start", a percussion cap carried thereby, said cap being in contact with the explosive, said "start" having an enlarged portion extending without said capsule, and a water-proof seal between said head and capsule.

9. In combination, two capsules each having an open end, and means to connect said capsules together with open end to open end, said capsules containing a quick rending explosive, a "start", a percussion cap on each end of said "start", one cap being in contact with the explosive in one capsule and the other cap with the explosive in the other capsule.

10. In combination, two capsules each having an open end, and means to connect said capsules together with open end to open end, said capsules containing a quick rending explosive, a "start", a percussion cap on each end of said "start", one cap being in contact with the explosive in one capsule and the other cap with the explosive in the other capsule, and a water-proof seal for the open ends of said capsules.

11. In combination, two capsules each having an open end, and means to connect said capsules together with open end to open end, said capsules containing a fulminate of mercury, a "start", a percussion cap on each end of said "start", one cap being in contact with the explosive in one capsule and the other cap with the explosive in the other capsule.

12. In combination, two capsules each having an open end, and means to connect

said capsules together with open end to open end, said capsules containing a fulminate of mercury, a "start", a percussion cap on each end of said "start", one cap being in contact with the explosive in one capsule and the other cap with the explosive in the other capsule, and a water-proof seal for the open ends of said capsules.

13. In combination, two capsules each having an open end, and means to connect said capsules together with open end to open end, said capsules containing a quick rending explosive, a "start", a percussion cap on each end of said "start", one cap being in contact with the explosive in one capsule and the other cap with the explosive in the other capsule, said "start" having an enlarged central portion.

14. In combination, two capsules each having an open end with open end to open end, said capsules containing a quick rending explosive, a "start", a percussion cap on each end of said "start", one cap being in contact with the explosive in one capsule and the other cap with the explosive in the other capsule, said "start" having an enlarged central portion, and a water-proof seal between said head and said capsules.

15. In combination, two capsules each having an open end, and means to connect said capsules together with open end to open end, said capsules containing a fulminate of mercury, a "start", a percussion cap on each end of said "start", one cap being in contact with the explosive in one capsule and the other cap with the explosive in the other capsule, said "start" having an enlarged central portion.

16. In combination, two capsules each having an open end with open end to open end, said capsules containing a fulminate of mercury, a "start", a percussion cap on each end of said "start", one cap being in contact with the explosive in one capsule and the other cap with the explosive in the other capsule, said "start" having an enlarged central portion, and a water-proof seal between said head and said capsules.

In testimony of which invention, I have hereunto set my hand, at Philadelphia, on this 20th day of June, 1907.

LUKE H. BROADWATER.

Witnesses:

M. M. HAMILTON,
A. M. URLAN.