

No. 815,119.

PATENTED MAR. 13, 1906.

J. R. POWELL.
COMPOUND SQUIB.

APPLICATION FILED APR. 28, 1905.

2 SHEETS—SHEET 1.

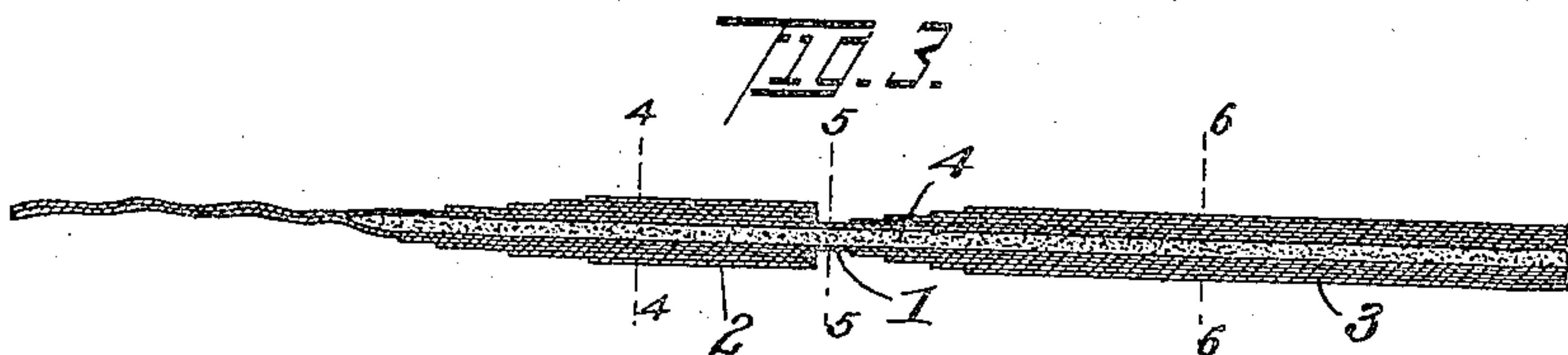
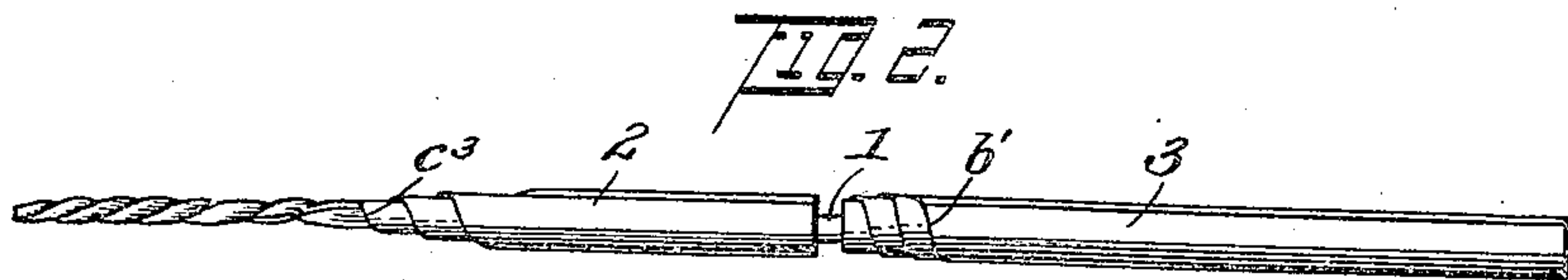
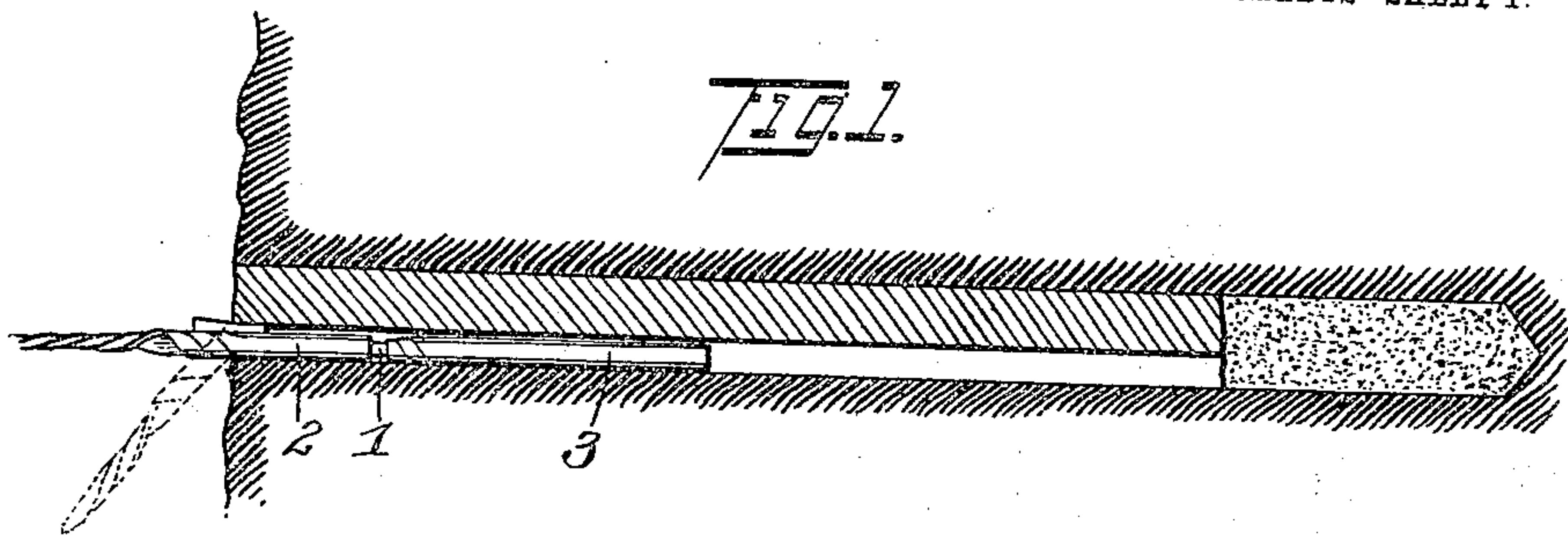


FIG. 4.



FIG. 5.

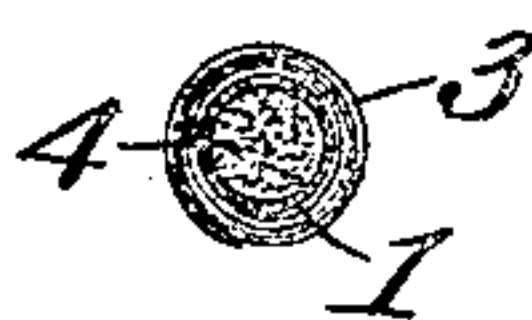
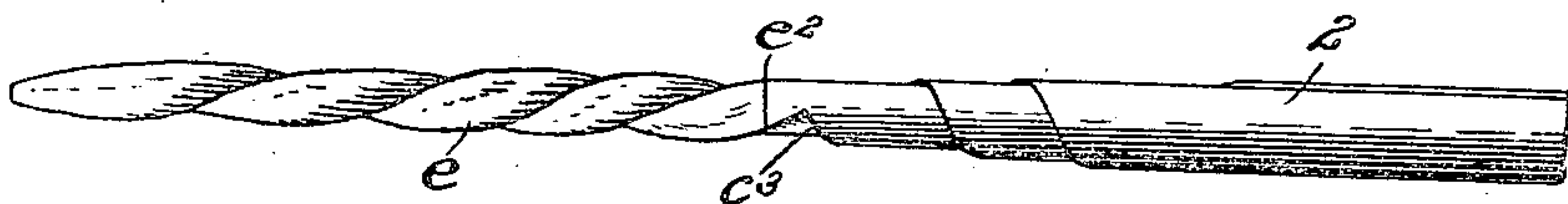


FIG. 6.



FIG. 7.



Witnesses

M. C. Lyddane
Lucas E. Gulik

John R. Powell, Inventor

By

E. G. Siggers

Attorney

No. 815,119.

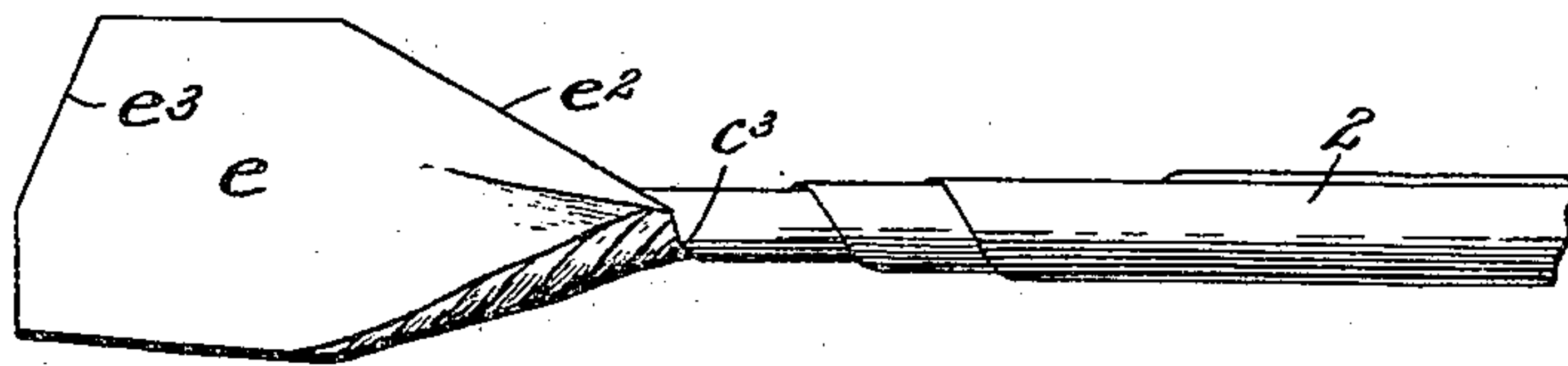
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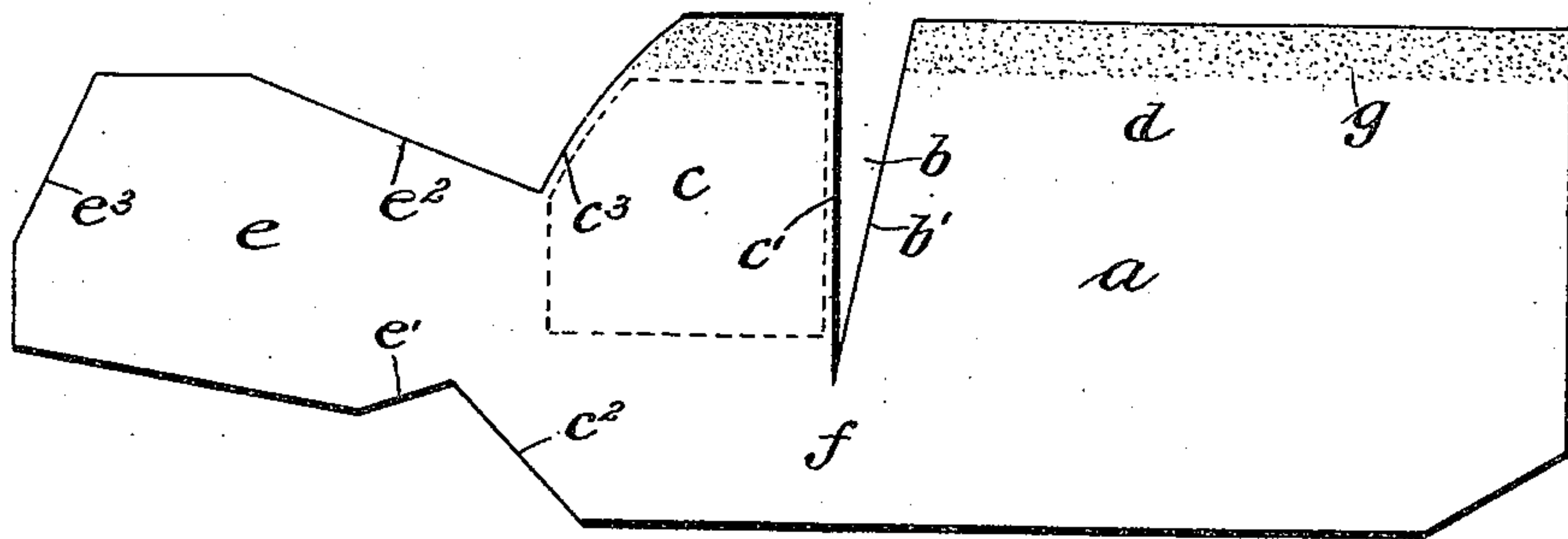
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2 SHEETS—SHEET 2.

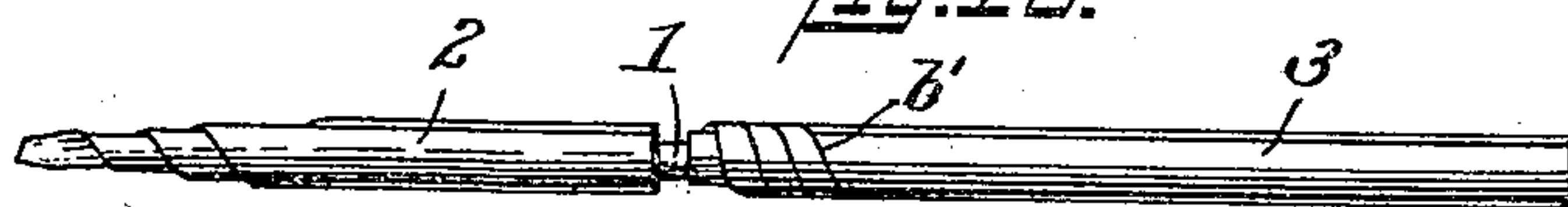
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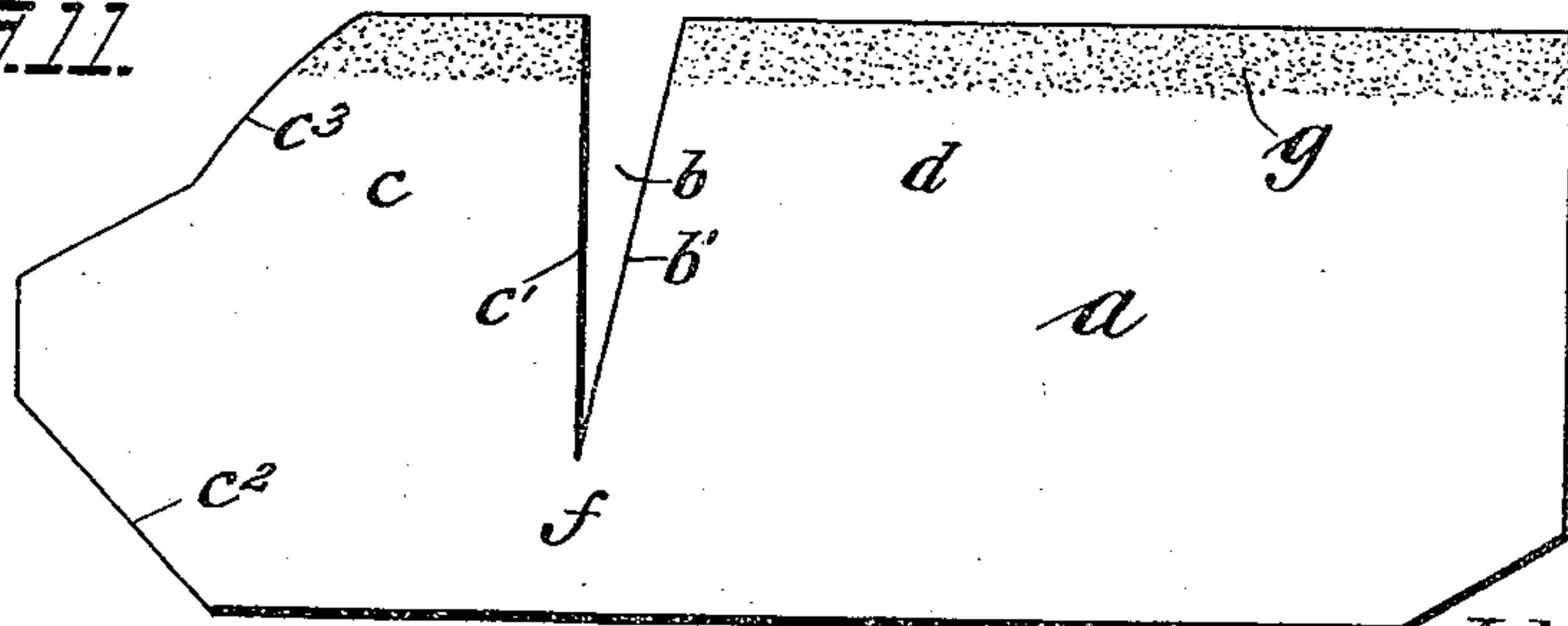
10.9.



10.10.



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Witnesses

M. C. Lyddane
Rec'd L. J. L. L.

Inventor
John R. Powell

By

E. G. Ligger

Attorney

UNITED STATES PATENT OFFICE.

JOHN R. POWELL, OF PLYMOUTH, PENNSYLVANIA.

COMPOUND SQUIB.

No. 815,119.

Specification of Letters Patent.

Patented March 13, 1906.

Application filed April 28, 1905. Serial No. 257,902.

To all whom it may concern:

Be it known that I, JOHN R. POWELL, a citizen of the United States, residing at Plymouth, in the county of Luzerne and State of Pennsylvania, have invented a new and useful Compound Squib, of which the following is a specification.

This invention relates to a compound squib, particularly useful in blasting "off the solid," but not necessarily restricted to such use. The fuse is of that general type disclosed in my concurrent application for Letters Patent, Serial No. 220,420, filed August 11, 1904, and comprises front and rear sections, the former being wedged or otherwise retained at the outer end of the "needle-hole" or "blasting-barrel," as the case may be, and the latter being arranged to fly back to the charge. In the squib disclosed in the application aforesaid two entirely separate and distinct tubular sections have a limited telescopic connection, the rear section having the form of a short piece of fuse which is extended loosely into a flexible sleeve projecting beyond the rear end of the front section, which has the form of a short squib. The sectional squib thus constructed, while entirely efficient, is comparatively expensive because of the necessity for separately preparing the sections and for subsequently assembling the parts. Furthermore, the sections of squibs so formed are apt to become separated in packing and handling and possibly also during the manipulation of the front section incidental to the fastening of the squib in the blast-conduit.

Having in mind the elimination of these more or less objectionable characteristics, one object of the present invention is to construct a compound squib in the form of a single tube capable of being filled with powder or other explosive material by a single operation, but divided, essentially, into front and rear sections by the weakening of the tube. This integral but weakened connection between the sections effectually prevents their accidental separation, but permits the front section to be clamped or otherwise securely held at the outer end of the needle-hole or blasting-barrel and at the same time allows the rear section of the squib to fly back to the charge as soon as the weakened portion of the tube is burned.

Another object is to construct the entire

squib, exclusive of the explosive substance, from a blank formed from a single piece of paper or other suitable material.

Another object is to so form the blank, and more particularly that portion connecting the match and the body portion of the blank, that the ignition of the squib proper when the match has completely burned will be absolutely insured and also in such a manner that while the match may be untwisted and opened out it will nevertheless maintain the closure at the front end of the squib with the convolutions of the tubular wrapper securely locked against any tendency to unwind.

To the accomplishment of the recited objects and others subordinate thereto the invention resides in that construction and arrangement of parts to be hereinafter described, illustrated in the accompanying drawings, and finally claimed.

In said drawings, Figure 1 is a general view showing my compound squib applied as in use. Fig. 2 is a side elevation of the squib. Fig. 3 is a longitudinal section thereof. Figs. 4, 5, and 6 are transverse sections on the lines 4 4, 5 5, and 6 6 of Fig. 3. Fig. 7 is an enlarged view of the front end of the squib, designed more particularly to illustrate the juncture of the match and the body portion of the tube. Fig. 8 is a similar view showing the match untwisted or opened out. Fig. 9 is a view of the blank from which the squib shown in the preceding figures is constructed. Fig. 10 is a side elevation of a squib constructed in accordance with my invention, but without a match; and Fig. 11 is a view of the blank employed for the manufacture of the squib shown in Fig. 10.

Each part wherever shown is designated by the same reference character.

The blank *a* (shown in Fig. 9) is cut from a single piece of thin paper or other suitable material and is of general oblong form. What may be termed the "body portion" of the blank is divided by a substantially V-shaped kerf *b* into front and rear portions *c* and *d*, the front portion *c* being somewhat shorter than the portion *d* and having extended therefrom the match portion *e*, which is somewhat narrower than the body portion of the blank and is of somewhat irregular form, as shown. The rear edge *c'* of the front portion *c* is straight, as shown, while the adjacent or front edge *b'* of the rear portion *a* is

somewhat inclined, as shown, the two portions c and d being connected by a comparatively narrow ligament f . The front edges c^2 and c^3 of the front portion c converge inwardly to the base of the match portion e , but are not arranged in directly opposite relation, the front end of the edge c^3 being opposite an intermediate point of the edge c^2 . The rear edges e' and e^2 of the part e diverge forwardly from the front ends of the edges c^2 and c^3 , the edge e^2 being considerably longer than the edge e' . Finally a portion of the front edge of the match is disposed angularly, as shown at e^3 .

In constructing the squib the body portion of the blank is rolled into tubular form upon a suitable spindle and retained after the withdrawal of the spindle by an adhesive substance g , applied along the upper edge of the blank, as shown. This produces a continuous tube weakened, as indicated at 1, to define front and rear squib-sections 2 and 3, which while integrally connected are designed to be instantly disconnected by the incineration of the ligament f of the blank. The tube thus formed is filled with powder or other combustible material 4, and its rear end is sealed in any well known or suitable manner. The match is then tightly twisted and the manufacture of the squib is complete. It will now be noted that since the rolling of the tube is commenced from the lower side of the blank and since the tube is of small diameter a complete convolution of the tube will have been formed before the match is reached—that is to say, before that portion of the blank lying below the upper end of the front edge c^2 is reached in the process of winding or wrapping the blank. Therefore when the match is twisted or rolled its lower portion will surround the upper portion of the initial convolutions of the tube, inasmuch as the lower end of the edge e^2 of the match portion e is located in rear of the front end of the edge c^2 . While the match proper can be untwisted, it is impossible to completely open up the front end of the squib in a manner to permit the escape of the powder. Furthermore, the converging upper front edges of the body portion of the blank cause the front end of the tube to assume a substantially conical form, the edges of which are readily ignited from the match, as distinguished from those constructions wherein a tightly-wound match extends axially from the extremity of a cylindrical squib and tends to choke or go out before the body portion of the squib is ignited.

In use the squib is inserted in a firing-conduit, whether a needle-hole, a blasting-barrel, or the like, and its front section is securely wedged in place in a manner to prevent the dislodgment of the squib by gas or air currents or by the concussion of adjacent explosions. When the match is ignited and

consumed, the fire will travel back along the front section of the fuse until the weakened portion 1 thereof is reached. This portion of the tube being far more fragile than those portions surrounding the front and rear sections will be quickly consumed, and the rear section being thus liberated will fly back in a manner well understood in the art to ignite the charge located at the rear end of the firing-conduit. If desired, the weakened portion or ligament f of the blank may be treated with some highly-combustible material in order to facilitate its destruction and the consequent liberation of the rear squib-section. Also, if desired, the weakening of the squib may be accentuated by the reinforcing of the sections 2 and 3. While this may be done in a variety of ways, a simple and convenient arrangement is to dispose a reinforcement upon the blank prior to rolling, this reinforcement being preferably in the form of a comparatively heavy piece of paper placed upon the front portion c of the blank, as indicated in dotted lines in Fig. 9.

It is thought that from the foregoing the construction of my improved compound squib and the many advantages accruing therefrom will be clearly comprehended; but I desire, however, to be understood as reserving the right to effect such changes, modifications, and variations of the illustrated structure as may come fairly within the scope of the protection prayed.

What I claim is—

1. A squib, including a casing or tube weakened to define two integrally-connected separable sections.

2. A squib, comprising two distinct but integrally-connected separable sections and a match.

3. A squib, including a casing or tube weakened to define two integrally-connected separable sections and an integral match.

4. A squib comprising a piece or strip of material wound into tubular form to constitute a container or casing, an intermediate portion of said piece or strip being narrower than the end portions thereof to produce a thin or weakened portion in the tube.

5. A squib, including a single tube or casing having an intermediate portion which is more highly combustible than the end portions thereof.

6. A squib, including a single tube or casing having an intermediate portion which is more highly combustible than the end portions thereof and a match extending from one end of the tube and integral therewith.

7. A fuse-blank, comprising a body portion and a narrower match portion extending from one end thereof, said body portion being narrower at an intermediate portion than at the ends thereof.

8. A blank of the character described, comprising a body portion and a match por-

tion, the body portion having converging front edges terminating at the base of the match portion.

5 9. A blank of the character described, comprising a body portion having converging front edges and a narrower match portion having rear edges diverging from the front end of the match portion.

10 10. A blank of the character described, comprising a body portion having forwardly-converging edges, the front end of one of said edges being located opposite an intermediate point of the other, and a match portion narrower than the body portion and having rear
15 edges diverging forwardly from the front end of the body portion, one of said diverging edges being longer than the other.

11. A blank of the character described, comprising a body portion having forwardly-converging edges, the front end of one of said edges being located opposite an intermediate point of the other, and a match portion narrower than the body portion and having rear edges diverging forwardly from the front end of the body portion, one of said diverging
20 edges being longer than the other, and said match having an angular front edge.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

JOHN R. POWELL.

Witnesses:

JOHN H. SIGGERS,
GEORGE TATE.