

(No Model.)

W. BICKFORD-SMITH & G. J. SMITH.

MEANS FOR IGNITING FUSES WITHOUT EXPOSING FLAME OR SPARKS.

No. 429,598.

Patented June 10, 1890.

Fig. 1.

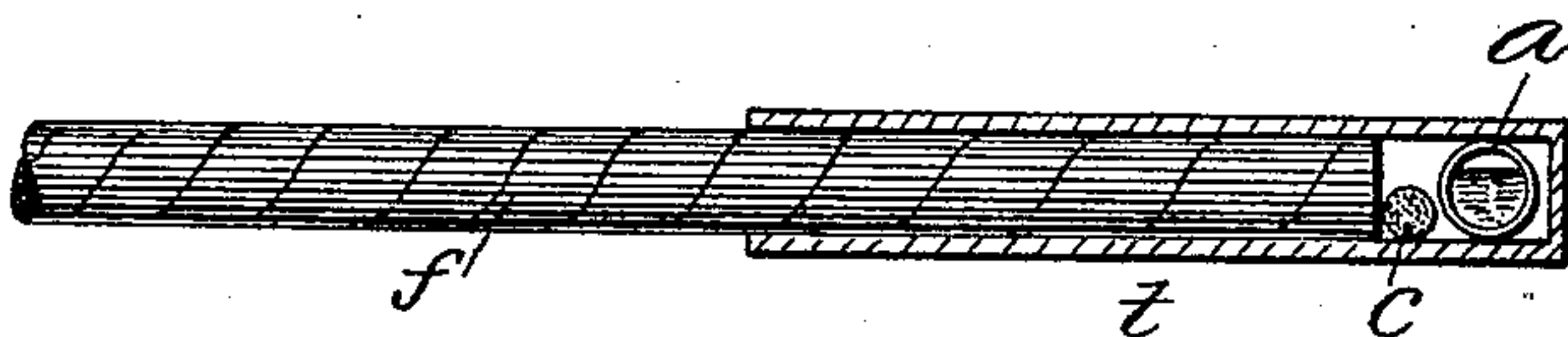


Fig. 2.

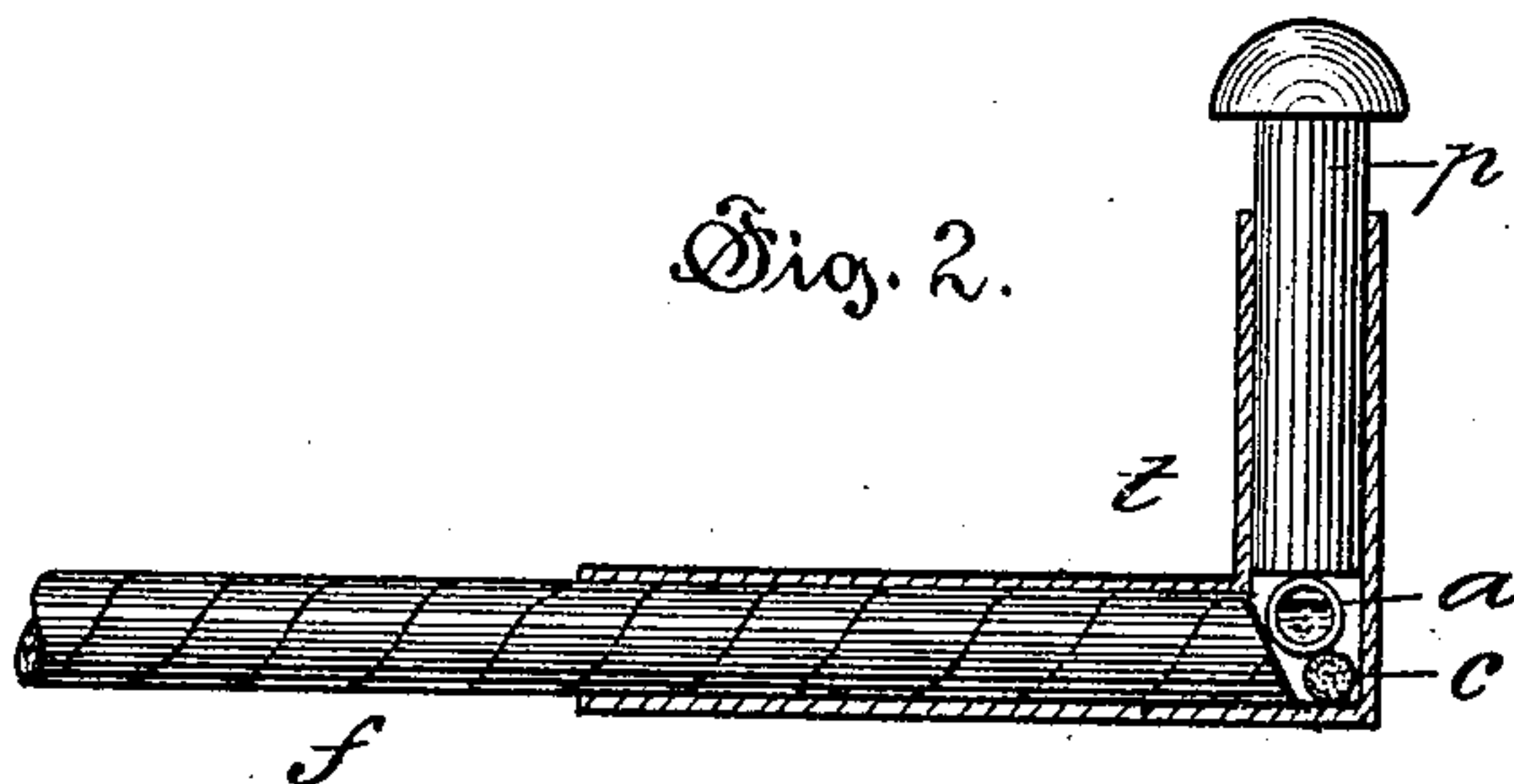


Fig. 3.

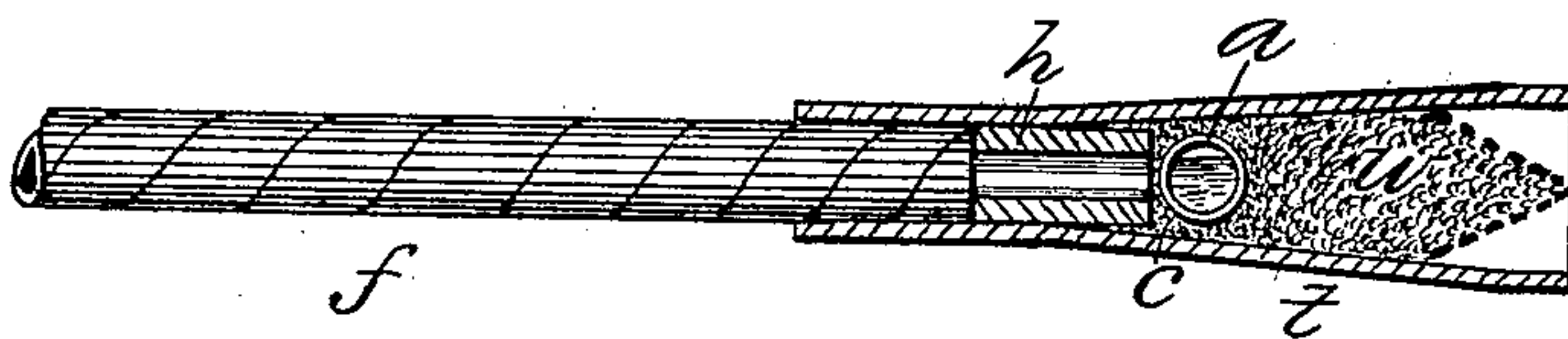


Fig. 4.



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UNITED STATES PATENT OFFICE.

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MEANS FOR IGNITING FUSES WITHOUT EXPOSING FLAME OR SPARKS.

SPECIFICATION forming part of Letters Patent No. 429,598, dated June 10, 1890.

Application filed March 25, 1889. Serial No. 304,575. (No model.) Patented in England January 10, 1887, No. 391.

To all whom it may concern:

Be it known that we, WILLIAM BICKFORD SMITH, of Helston, county of Cornwall, England, and GEORGE J. SMITH, of Truro, county of Cornwall, England, doing business at Tuckingmill, in the county of Cornwall, England, have invented certain new and useful Improvements in the Means of Igniting Fuses without Exposing Flame or Sparks, (for which we received Letters Patent in England, No. 391, dated January 10, 1887;) and we do hereby declare that the following is a full, clear, and exact description of the invention, which will enable any one skilled in the art to which it appertains to make and use the same.

This invention relates to means of igniting fuses without exposing flame or sparks, the object being to avoid the risk of firing blasts in an inflammable or explosive atmosphere.

In the accompanying drawings, illustrating our invention, Figure 1 is a longitudinal section of a tube arranged on a fuse. Fig. 2 is a similar view of an elbow-tube having a plunger to break the acid globule. Fig. 3 is a similar view showing a modified construction and means. Fig. 4 is a view of a cap for the tubes when not on the fuse.

The object and purpose of our invention are accomplished as follows: In a tube, into which the end of the fuse to be ignited can be inserted, we place separately a small quantity of a mixture of chlorate of potash and sugar and a small quantity of sulphuric acid, and we provide means of bringing these in contact with each other and with the fuse, so that the flame caused by the chemical action ignites the fuse within the tube without presenting itself externally. The small quantities of the chemicals employed may be made up in various ways. Thus the mixture of chlorate of potash and sugar may be made up with an agglutinating substance to form a pill, which can be dropped into the tube; or it may be put in as loose powder, and the sulphuric acid is inclosed in a small glass globule, which can be broken to liberate the acid when ignition is desired.

Fig. 2 of the accompanying drawings is a longitudinal section of one form of igniting apparatus according to this invention. In the

tube *t*, which has one end closed, is placed a globule *a* containing sulphuric acid, and near it is placed the pill *c* of chlorate of potash and sugar. On thrusting the fuse *f* into the tube, so as to break the globule and crush the pills and bring the acid and chlorate mixture into intimate contact, flame is produced, which ignites the fuse. In the modified form of apparatus shown in Fig. 2 an elbow-pipe *t* is employed with the plunger *p* in one of its limbs. On thrusting down the plunger the globule *a* of acid is broken and the liberated acid, acting on the chlorate mixture *c*, produces a flame which ignites the fuse *f*.

Fig. 3 shows a convenient form of igniting apparatus, which can be charged ready for use in the following manner: *t* is a taper tube of flexible metal, such as tin plate. Into this tube is pushed a short piece of fuse *h*, forming a plug at the smaller end. On this plug is laid in powder *c* the mixture of chlorate of potash and sugar, and on it the globe *a* of acid. The tube then is nearly filled up with soft material—such as cotton wool *w*—and closed by pinching its end, as indicated by the dotted lines. A cap *l* (shown in Fig. 4) may also be put on the small end of the tube, so that the contents are quite closed in. When the apparatus is ready to be used for ignition, the cap *l* is removed from the tube and the end of the fuse *f* is pushed in, so as to come in contact with the fuse-plug *h*, and in order to prevent the fuse from being blown out of the tube, and to prevent sparks from finding their exit to the atmosphere, it is apparent that the fuse and tube must fit snugly together, the parts being arranged in connection, as stated. On pinching the tube at the part where the globule *a* is situated the globule is broken, and the acid, being liberated, acts on the chlorate mixture *c*, causing flame, which ignites the fuse-plug *h*, and this in its turn ignites the main fuse *f*.

We claim as our invention—

1. In a means for igniting fuses without exposing sparks or flame, the combination of a tube closed at one end, a fuse inserted in the tube, a mixture of chlorate of potash and sugar in the tube, and a globule of sulphuric acid in the tube adjacent to said mixture, and both the acid and mixture being located be-

tween the closed end of the tube and the end of the fuse, and means, substantially as described, for diffusing the acid, as specified.

2. In a means for igniting fuses without exposing sparks or flame, the combination of a
5 tube closed at one end, a fuse inserted in the tube, a mixture of chlorate of potash and sugar in the tube, sulphuric acid in the tube adjacent to the said mixture and normally
10 held from combining therewith, said acid and mixture being located in the tube between the closed end thereof and the end of the fuse, and means, substantially as described, for dif-

fusing the acid, substantially as and for the purpose specified.

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