

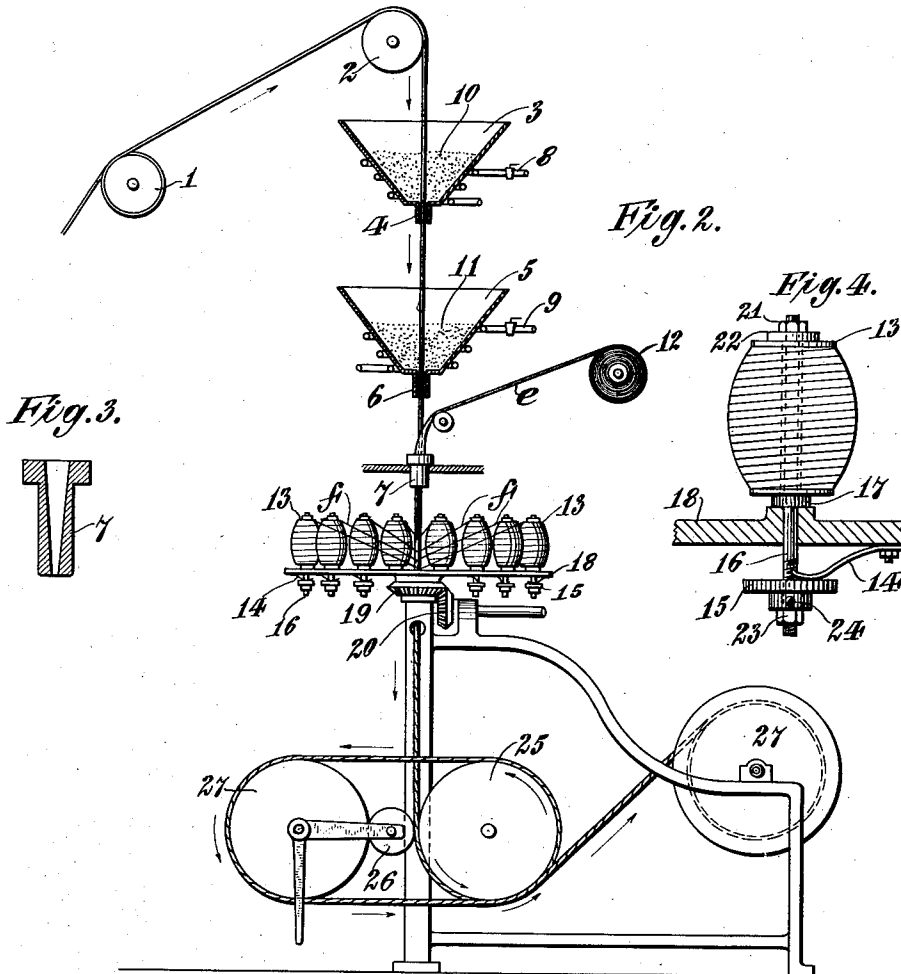
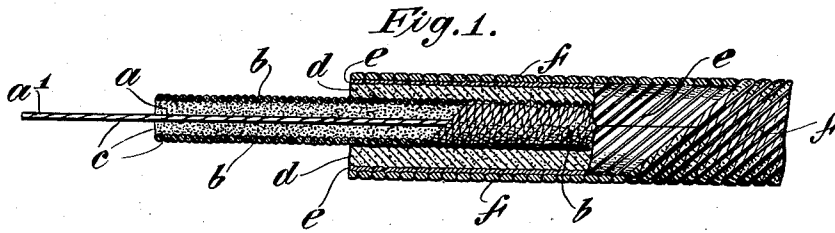
H. E. ELLSWORTH.

FUSE.

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1,023,142.

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UNITED STATES PATENT OFFICE.

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FUSE.

1,023,142.

Specification of Letters Patent.

Patented Apr. 16, 1912.

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To all whom it may concern:

Be it known that I, HENRY E. ELLSWORTH, a citizen of the United States, and a resident of the town of Simsbury, in the State of Connecticut, have invented certain new and useful Improvements in Fuses, of which the following is a specification.

This invention relates to fuses and to the method of and the apparatus for manufacturing the same and particularly to safety fuses such as are employed in continuous lengths where it is desirable to have a fuse so constructed that it will be impervious to water or dampness.

As showing a specific embodiment of the invention reference is made to the drawings forming a part of this specification, in which,

Figure 1 represents a portion of the fuse shown partly in section. Fig. 2 represents the apparatus by which the fuse is made. Fig. 3 is a sectional detail view of the tube through which the paper for enveloping the portion *c* of the fuse is passed after said portion *c* has been coated with water-proof material. Fig. 4 is an enlarged detail view of the spool holding means with a spool in position thereupon.

The powder or burning medium *a* surrounds a central longitudinal strand *a'* and the burning medium is in turn surrounded by a casing which in the fuse shown is formed by spinning around said burning medium the strands *b*, which may be rendered fireproof by the treatment disclosed in my Patents No. 920,118 and No. 920,119 of May 4, 1909, but it is obvious that as far as my present invention is concerned any suitable casing, which may or may not be fireproof may be used for holding the burning medium. The strands or threads *b* may be counterwound by other strands to aid in holding the first mentioned strands *b* more rigidly in place but this is not necessary and has not been disclosed in this application but is shown and described in my prior Patent No. 920,118 above referred to.

The portion *c* of the fuse which comprises the casing formed of the strands *b* and the burning medium *a* is covered by a waterproof coating *d* by passing the same over guide pulleys 1 and 2 into kettle 3 containing a waterproof material 10, preferably asphaltum and gutta percha, down through

a tubular guide 4 thence into another kettle 55 containing waterproof material 11, such as asphaltum or other suitable material to further add to the waterproof qualities, down through another tubular guide 6. As the material in the kettle is hot, maintained 60 so by the heating means designated as 8 and 9, it will form upon the portion *c* of the fuse a soft plastic coating *d* and while the coating is hot and soft and plastic the portion *c* with the coating thereupon is enveloped by a 65 paper or other equivalent impervious covering *e* which is delivered from the roll 12 and is formed or folded (preferably into a tube with the seam, or edges which lap, extending longitudinally) around the coated portion *c* as it passes through the tubular guide 7. As the fuse portion *c* covered with the waterproofing material is delivered from the means which envelop the same with paper it is wound by strands *f* which are 75 under sufficient tension whereby the strands *f* are compressed or embedded into the paper tube and whereby the waterproof material is forced into the strands *b* which form the casing which is part of the portion *c* of the 80 fuse and any counterstrands that may be wound thereupon. This will firmly embed the paper casing into the waterproofing material and will also cause the waterproofing material to thoroughly impregnate the casing of the portion *c*. The winding of the 85 strands under tension around the paper enveloped portion is accomplished by means of spools 13, rotated around the fuse as delivered from the means for enveloping the 90 same with paper and the strands delivered from said spools may be maintained under tension by means of springs 14 which engage collars 15 screwed upon the spindles 16 which carry the spools. The rotation of 95 the spools about the fuse as delivered from the paper enveloping means is accomplished by mounting the spindles 16 on the plate 18 which is rotated by means of bevel gearing 19 and 20 from any suitable source of power. 100 In the form shown each of the spindles 16 is provided with a collar 17 integral therewith and each spindle is mounted in the plate 18 so that it can revolve relative to the plate. The spools are clamped on the spindles 105 between the collars 17 and the nuts and washers 21 and 22 so that as the spools are caused to rotate by the strands *f* being

drawn therefrom a rotary movement will be imparted to the spindles 16. As the collar 15 is screwed upon the spindle 16 it can be positioned so that the spring 14 will impart
5 different degrees of pressure thereto, thereby serving as a means to regulate the tension on the strand *f*. The collars 15 are locked in position by means of the lock nuts 23 and the set screws 24.

10 While I have disclosed a spring pressing against a collar as means to maintain the strands *f* under tension during the winding still it is obvious that other constructions than that described and shown might be
15 utilized to wind the strands under the tension around the paper enveloped portion of the fuse; for example, the spindles, upon which the spools are placed may be fixed in the rotatable plate 18 and the strands delivered from the spools may be, and in fact
20 often are, maintained under tension by the friction created by the centrifugal force throwing the spools outwardly against the spindles or spool supports; the spools in this case being revoluble relative to the spindles.

25 After the strands *f* are wound around the paper enveloped portion the fuse passes between the comparatively large pulley 25 and the guide pulley 26 over said pulley 25: from thence over the guide pulley 27, which is
30 also comparatively large, to the reel 27 upon which the fuse is wound.

It is obvious that other waterproof coating materials than those described might be
35 utilized and also that a greater or less number of kettles containing waterproof material might also be used. It is also obvious that various forms and modifications may be made without departing from the spirit and
40 scope of the invention.

I claim as my invention:

1. The method of manufacturing fuse which consists in covering with an impervious envelop a core comprising a burning
45 medium and a casing surrounding the burning medium, said casing coated with a waterproof material, and applying external pressure to the exterior of the impervious envelop while the waterproof material is
50 soft and plastic in order to impregnate the casing with the waterproof material.

2. The method of manufacturing fuse which consists in winding strands under tension on a portion comprising a burning
55 medium and a casing therefor, which portion has been covered with waterproofing material surrounded by an impervious covering; the winding being carried out while the waterproofing material is hot.

60 3. The method of manufacturing fuse which consists in winding strands under tension on a portion comprising a burning medium and a casing therefor, which portion has been covered, with a waterproofing
65 material surrounded by an impervious flexi-

ble covering; the winding portion being carried out while the waterproofing material is soft and plastic.

4. The method of manufacturing fuse which consists in enveloping in paper a portion, comprising a burning medium, a casing therefor and waterproofing material covering the casing; and then winding strands under tension around the paper envelop while the waterproofing material is hot. 70

5. The method of manufacturing fuse which consists in enveloping in paper a portion comprising a burning medium, a casing therefor and waterproofing material covering the casing; and then winding strands under tension around the paper envelop while the waterproofing material is soft and plastic. 75

6. The method of manufacturing fuse which consists in covering a portion which comprises a burning medium, a casing therefor and a waterproof material surrounding the casing, with strands and causing the strands to press the waterproof material when the waterproof material is hot, whereby the waterproof material is impregnated in the casing. 80

7. The method of manufacturing fuse which consists in enveloping in paper a portion comprising a burning medium, a casing therefor and a waterproof material covering the casing, and then surrounding with strands the paper envelop and impressing the strands into the paper envelop when the waterproof material is soft and plastic, whereby the waterproof medium is impregnated into the casing. 85

8. The method of manufacturing fuse which consists in enveloping in paper a portion comprising a burning medium, a casing therefor and a waterproof material covering the casing, and winding with strands the paper envelop and impressing the strands into the paper envelop when the waterproof material is hot whereby the waterproof medium is impregnated into the casing. 90

9. The method of manufacturing fuse which consists in enveloping in a tube a portion comprising a burning medium, a casing therefor and a waterproof material covering the casing, and winding with strands the enveloped portion and impressing the strands into the enveloping tube when the waterproof material is soft and plastic. 95

10. A fuse comprising a burning medium, a casing therefor, a waterproof medium covering the casing, paper enveloping the waterproof medium and strands surrounding and embedded in the paper envelop; the waterproof medium being impregnated in the casing. 100

11. A fuse comprising a burning medium, a casing therefor, a waterproof medium covering the casing, an impervious envelop en- 105

veloping the waterproof medium and strands wound around the paper enveloping the waterproof medium; the waterproof medium being impregnated in the casing.

5 12. A fuse comprising a burning medium, a casing therefor, a waterproof medium covering the casing; a tube enveloping the waterproof medium and strands surrounding and embedded in the tubular envelop.

10 13. A fuse comprising a burning medium a casing therefor, a waterproof medium covering the casing; a tube enveloping the waterproof medium and strands wound around and embedded in the tubular envelop.

15 14. A fuse having a portion comprising a burning medium, a fibrous casing and a waterproof coating; a paper tube enveloping said portion, and strands surrounding and embedded in the paper tube and the waterproof medium.

20 15. A fuse comprising a burning medium, a casing therefor, a waterproof medium and strands wound under tension around the waterproof medium; said strands imparting pressure to the waterproof medium, and the waterproof medium being impregnated in the casing.

30 16. A fuse comprising a burning medium, a casing therefor, a waterproof medium covering the casing, paper enveloping this waterproof medium and strands wound under tension around the paper casing on

the waterproof medium; the waterproof medium being impregnated in the casing.

35 17. A fuse having a portion comprising a burning medium a fibrous casing and a waterproof coating; a paper tube enveloping said portion, and strands wound under tension around the paper tube on the waterproof medium.

40 18. A fuse having a portion comprising a burning medium, a fibrous casing and a waterproof coating; a tube, having a longitudinally extending seam, enveloping said portions; and strands wound under tension around the tube on the waterproof medium.

45 19. A fuse having a portion comprising a burning medium, a casing therefor, and a waterproof medium covering the casing; a substantially impervious tube incasing the portion; and strands wound under tension around the tube and embedded therein.

50 20. A fuse having a portion comprising a burning medium in a casing and a waterproof coating which penetrates the casing; a paper tube enveloping said portion and contacting with the waterproof coating, and strands under tension around the paper tube.

60 This specification signed and witnessed this 16th day of July, A. D., 1910.

HENRY E. ELLSWORTH.

Signed in the presence of—

CHAS. A. BUERMAN,
L. S. ELLSWORTH.