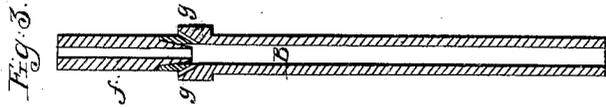


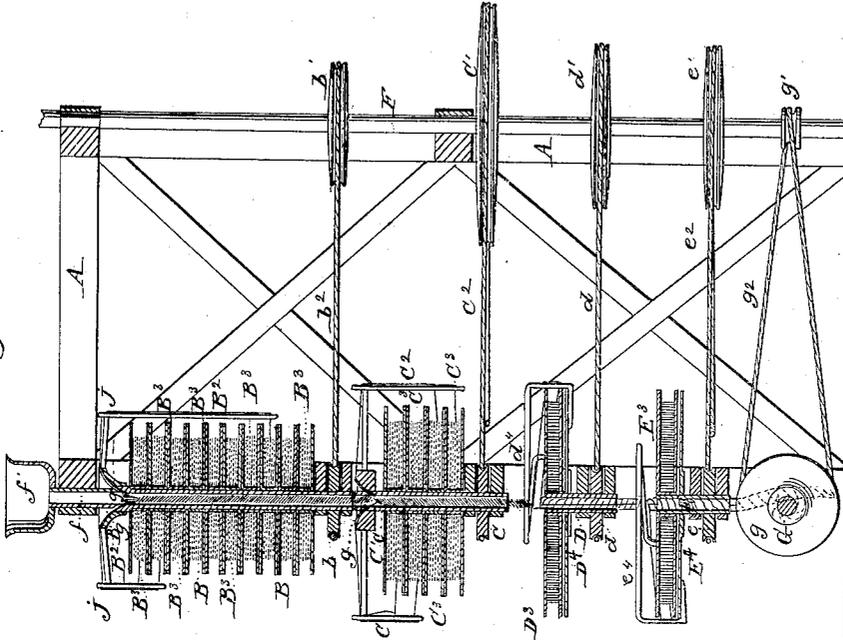
*R. Uren, T. Dunstone, & T. Blight.*  
*Making Fuse.*

*N<sup>o</sup> 37,079.*

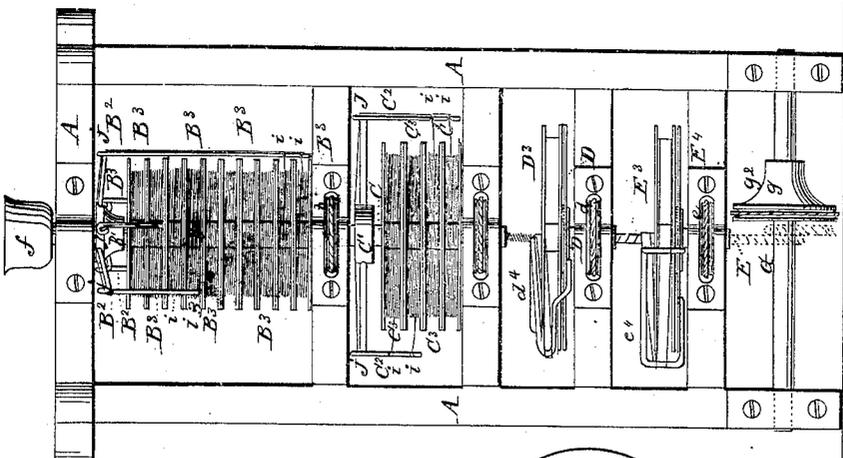
*Patented Dec. 2, 1862.*



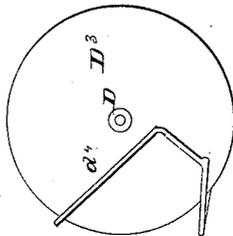
*Fig. 2.*



*Fig. 1.*



*Fig. 5.*



WITNESSES:

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# UNITED STATES PATENT OFFICE.

RICHARD UREN, THOMAS DUNSTONE, AND JOSEPH BLIGHT, ALL OF  
EAGLE HARBOR, MICHIGAN.

## IMPROVEMENT IN MACHINERY FOR MANUFACTURING SAFETY-FUSE.

Specification forming part of Letters Patent No. 37,079, dated December 2, 1862.

*To all whom it may concern:*

Be it known that we, RICHARD UREN, THOMAS DUNSTONE, and JOSEPH BLIGHT, all of Eagle Harbor, in the county of Keweenaw and State of Michigan, have invented a new and Improved Machine for the Manufacture of Safety-Fuse; and we do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a front elevation of the machine; Fig. 2, a central vertical section of the same at right angles to Fig. 1. Fig. 3 is a central section of the upper tube or monkey on a larger scale than Figs. 1 and 2. Fig. 4 is a transverse or horizontal section of the same. Fig. 5 is a top view of one of the tape-winding tubes.

Similar letters of reference indicate corresponding parts in the several figures.

This invention consists in so arranging and giving motion to the tubes and fliers or guides and spools or bobbins of a fuse-making machine as to lay the yarns and tapes in opposite directions alternately and simultaneously, by which means the process of making the tape-covered fuse is enabled to be carried on continuously.

To enable others skilled in the art to make and use our invention, we will proceed to describe its construction and operation.

A is an upright frame, having in front the bearings for the flier-tubes B, C, D, and E, and having in rear the bearings for the upright shaft F, carrying the pulleys *b'*, *c'*, *d'*, and *e'*, from which the said tubes derive rotary motion through bands *b*<sup>2</sup>, *c*<sup>2</sup>, *d*<sup>2</sup>, and *e*<sup>2</sup>, running from the said pulleys to pulleys *b c d e* on the said tubes. The several tubes are arranged one above another with their several axes in line with each other, and the uppermost one, B, termed the "monkey," is fitted at the upper part with a smaller tube, *f*, surmounted by a funnel, *f'*, for feeding in the gunpowder, and below the tube *f* the said tube B has secured upon it a hub, *B'*, which carries the flier arms or guides B<sup>2</sup> B<sup>2</sup> B<sup>2</sup> for what are called the "primary yarns," in which the gunpowder is first inclosed. This hub is hollowed out at the top in funnel shape,

and from the bottom of its funnel-like cavity a number of holes, *g g*, corresponding in number with the primary yarns, communicate with the interior of the tube B, to conduct the yarns thereinto from the flier arms or guides B<sup>2</sup> B<sup>2</sup> B<sup>2</sup>, the said holes being at equal distances apart all round the tube B. The bobbins B<sup>3</sup> B<sup>3</sup> B<sup>3</sup>, which supply the primary yarns, are fitted loosely upon the tube B and placed one upon another, every one but the bottom one being directly upon the one below it, and the bottom one resting upon one of the rails of the framing A. The yarns are represented in red color. The flier arms or guides B<sup>2</sup> B<sup>2</sup> B<sup>2</sup> need not be so many as the spools and yarns, as each may have two or more fliers to conduct two or more yarns in the monkey B.

In the drawings, each of the said arms or guides has two eyes, *i i*, to conduct the yarns from two of the bobbins B<sup>3</sup> B<sup>3</sup> B<sup>3</sup>, and the said arms or guides are made of different lengths, according as their eyes receive yarns from higher or lower bobbins, the hub *B'*, to which said arms or guides are attached, being arranged above the several bobbins. The yarns, after passing through the eyes *i i*, pass upward through the eyes *j j* at the tops of the arms or guides, and thence down through the funnel-like cavity of the hub *B'* and through the holes *g g* into the monkey, where they meet the gunpowder that is fed in through the tube *f*. The rotary motion of the tube B and its attached flier arms or guides, derived through the band *b*<sup>2</sup>, as before described, causes the yarns to be twisted or wound around a core of gunpowder, their lower ends being prevented from turning by means of the windlass G at the bottom of the machine, which draws down the yarns into the tube as fast as they receive twist enough to make them hold the gunpowder. The tube C, which is arranged next below the upper tube or monkey, B, is precisely like B, only that it is shorter, as it is not required to carry so many bobbins, and that is not fitted with any upper tube, like *f*, to supply gunpowder, as it is intended to receive the primarily-twisted yarns and their continued core of gunpowder directly from the tube B. C is the hub with which the said tube C is furnished to carry its flier-arms C<sup>2</sup> C<sup>2</sup>. C<sup>3</sup> C<sup>3</sup> are the bobbins fitted to the tube C, like B<sup>3</sup> B<sup>3</sup> are

fitted to B. The arms C<sup>2</sup> C<sup>2</sup> have eyes *i i* and *j j*, like those of the arms B<sup>2</sup> B<sup>2</sup>, and the tube C has similar holes, *g g*. The yarns from the bobbins C<sup>3</sup> C<sup>3</sup> are conducted through the eyes *i i* and *j*, and through the holes *g g* in the tube C, which, by its rotation in the opposite direction to B, causes these yarns to be wound outside of the primary yarns from the bobbins B<sup>3</sup> B<sup>3</sup> in the opposite direction to the twist or winding of the latter, and this counterwinding secures the twist of the primary winding. Below the tube C, between it and the tube D, next below it, there is intended to be placed a vessel containing some waterproofing composition, through which the now partially completed fuse passes preparatory to the reception of the two tapes, which are wound upon it to complete it, the said vessel being warmed by steam, to keep the composition melted. This apparatus is not, however, represented in the drawings. The tube D carries a single bobbin or reel, D<sup>3</sup>, for supplying the first tape. This reel fits loosely to the tube, and lies upon a disk, D<sup>4</sup>, secured to the tube, and to this disk there is secured a guide, *d*<sup>4</sup>, by which the tape is conducted from the reel, as shown in Figs. 1, 2, and 5, to the fuse as the latter enters the tube D. The tapes, like the bobbins, are shown in red color. The rotation of the tube D causes it to unwind tape from the bobbin C, and wind it upon hot waterproof composition, which has been applied outside of the counterwound yarns as the fuse is drawn through the tubes by the windlass G. The rotation of the tube D is in the reverse direction to that of the tube C and in the same direction to that of B. The tube E

is precisely like D, being furnished with a disk, E<sup>4</sup>, and guide *e*<sup>4</sup>, similar to D<sup>4</sup> and *d*<sup>4</sup>, and carrying a bobbin, E<sup>3</sup>, like D<sup>3</sup>, and it receives a rotary motion in the opposite direction to D, by which it is caused to unwind the tape from the bobbin E<sup>3</sup> and wind it upon the fuse in the opposite direction to that in which the first tape was wound by the rotation of the tube D. The windlass G is driven by a band, *g*<sup>2</sup>, running from a pulley, *g*<sup>1</sup>, on the shaft F to a pulley, *g*, on its own shaft, the velocity at which this windlass is driven being relatively to the velocity of the rotation of the several tubes B C D E. The said windlass, taking the fuse from the tube E, in which the second tape is counterwound upon the first one, conveys it to the apparatus by which a coat of waterproofing material is applied.

What we claim as our invention, and desire to secure by Letters Patent, is—

The arrangement of and mode of driving the several tubes and their flier arms or guides and bobbins or spools, whereby both the yarns and tapes are laid, wound, or twisted in opposite directions, alternately and simultaneously, and the process of making the tape-covered fuse is enabled to be performed by a continuous operation, substantially as and for the purpose herein specified.

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Witnesses:

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