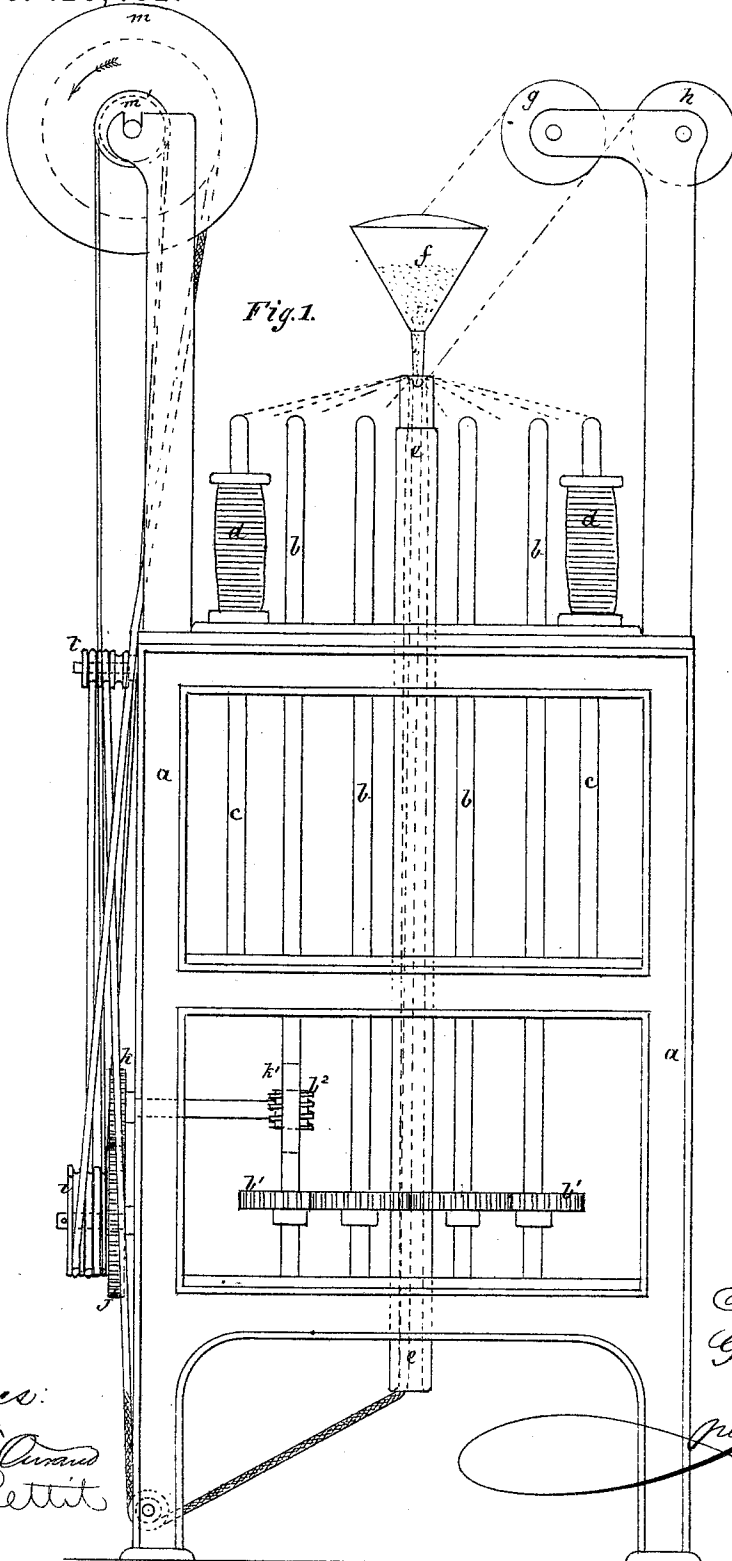


G. F. JAMES.
Manufacture of Fuses.

No. 126,462.

Patented May 7, 1872.



Witnesses:
T. L. L. O'Connell
C. A. Pettit

Inventor
G. F. James
per R. H. & C.
Attorneys

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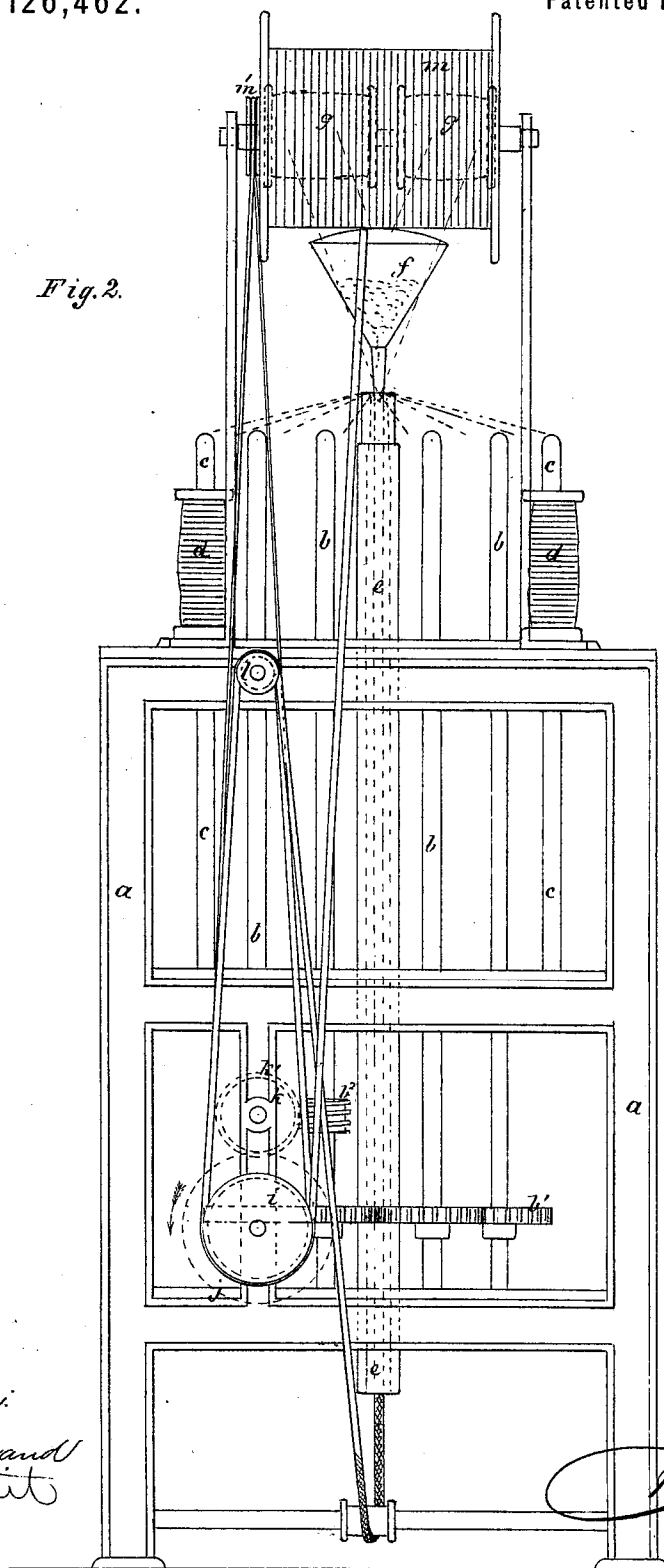
2 Sheets--Sheet 2.

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Fig. 2.



Witnesses:
T. D. L. Durand
G. A. Pettit

Inventor
G. F. James
per *[Signature]*
Attorneys

UNITED STATES PATENT OFFICE.

GEORGE F. JAMES, OF MANCHESTER, ENGLAND.

IMPROVEMENT IN THE MANUFACTURE OF FUSES.

Specification forming part of Letters Patent No. 126,462, dated May 7, 1872.

To all to whom it may concern:

Be it known that I, GEORGE FREDERICK JAMES, of Manchester, in the county of Lancaster, in England, machinist, have invented certain new and useful "Improvements in the Manufacture of Fuses for Blasting and other purposes, and in the machinery and apparatus employed therein;" and I hereby declare the following to be a full, clear, and exact description thereof, reference being had to the annexed drawing forming part of this specification.

In manufacturing my improved fuses I make use of a machine similar to the ordinary circular braiding-machine used in making tubular braid. To this braiding-machine I apply a hollow central spindle, above which is a self-acting feed apparatus for supplying the gunpowder or other explosive compound to the interior of the braid. In manufacturing my improved fuses it is necessary to draw the work down the hollow central spindle instead of drawing it off upward, as in ordinary braiding-machines. The cover of the fuse is made of cotton, hemp, jute, or other fibrous material, or of wire, or partly of fibrous material and partly of wire, and it is sometimes desirable to convey four or other suitable number of strands or yarns into the center of the fuse to increase its strength and bulk.

Description of the Drawing.

Figures 1 and 2 are a front and side elevation of an ordinary circular braiding-machine, to which the requisite machinery or apparatus is applied for manufacturing fuses according to my invention.

In these views, *a a* is the usual framing; *b b*, the upright shafts connected by the spur-pinions *b'*. *c c* are the spindles, with the bobbins *d d*, the yarns from which are intertwined or braided together in the ordinary manner at a point a little above the tops of the spindles *c*. The number of spindles and bobbins may be varied; but I find that sixteen give a good result. The mechanism for driving the upright shafts *b*, and for shunting the spindles and bobbins *c d*, does not need to be described, as it is similar to that employed in ordinary circular braiding-machines; but in order to render such a machine suitable for the purposes of my in-

vention, I apply to it the stationary hollow central spindle *e*, through which the braid is conveyed as fast as it is produced. Above the spindle *e* is the hopper *f*, containing the gunpowder or other explosive compound required for filling the braid or case of the fuse. The funnel *f* has a long spout, the lower end of which enters into the hollow central spindle *e*, and in order to facilitate the filling of the braid or case with gunpowder or other compound, I carry one or more threads of soft cotton from the bobbins *g g* through the cover of the funnel and through the gunpowder or other compound. As the fuse is carried down the hollow spindle *e* these cotton threads are drawn off their bobbins, and assist in carrying the gunpowder or other compound with them. The bobbins *d d* contain yarns of cotton, hemp, jute, or other fibrous material, but by preference jute, to form the outer case or shell of the fuse, and in order to increase the strength and bulk of the fuse, one or more additional strands or yarns of jute or other fiber may be drawn off the bobbins *h h*, and conveyed into the inside of the braid or fuse. The fuse is drawn down the central hollow spindle *l* by the grooved pulley *i*, to which is fixed the spur-wheel *j*, which is driven by the pinion *k*, and this pinion is driven by the worm *b'* on one of the upright shafts *b*. This worm gears into the wheel *k'*, on the same shaft as the pinion *k*. In order to produce the required friction on the fuse it is taken one or more times over the guide-pulley *l* and grooved pulley *i*, and ultimately it is wound on the bobbin *m*, which is turned round by a friction-band passing under the grooved pulley *i*, and over the pulley *m'* fixed to the bobbin *m*. By this arrangement the fuse is wound tight on the bobbin *m*.

My invention may be modified by passing a strand or coarse yarn of gun-cotton into the interior of the braid, instead of or in addition to the gunpowder or other explosive compound, as described; and in manufacturing very strong fuses it may be desirable to make the case of wire instead of jute or other fibrous materials, or partly of wire and partly of fibrous materials; or the fuse, when made in the manner described, may be passed through a second braiding-machine to increase the strength of

the case; and in order to protect the fuse from damp it may be taken through hot pitch or other water-proofing fluid.

Having thus stated the nature of my invention, and described a convenient manner of carrying the same into operation, I wish it to be understood that I do not intend to limit myself to the details given, as they may be considerably varied or modified; but

What I claim herein as new, and desire to secure by Letters Patent of the United States, is—

1. The combination of the hollow spindle *e* and funnel *f* with bobbins *c d* and carriers *b*, as and for the purpose described.

2. A braided fuse, made in the manner and for the purpose described.

In testimony whereof I have hereunto set my hand before two subscribing witnesses.

G. F. JAMES.

Witnesses:

H. B. BARLOW,

J. W. APPLEBY.