2 Sheets—Sheet 1.

G. F. JAMES.
Braiding Machine.

No. 197,374 Patented Nov. 20, 1877.

Fig. 2.

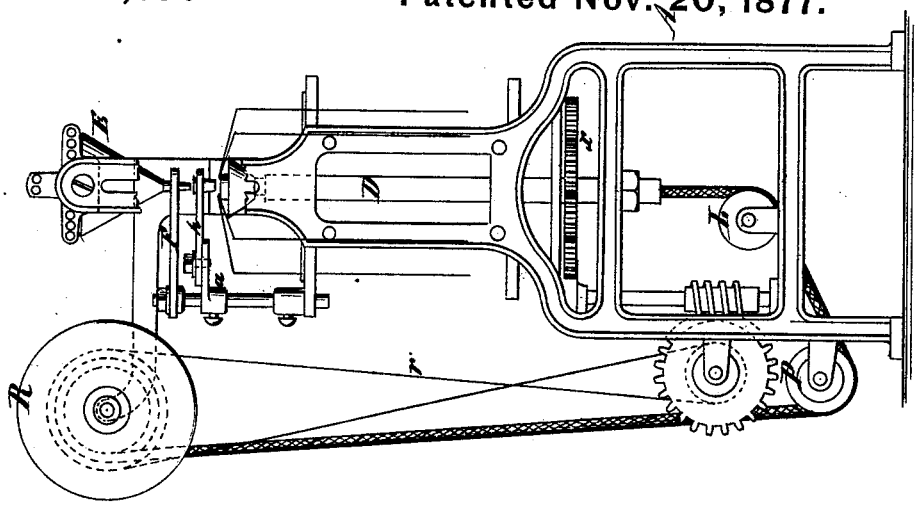
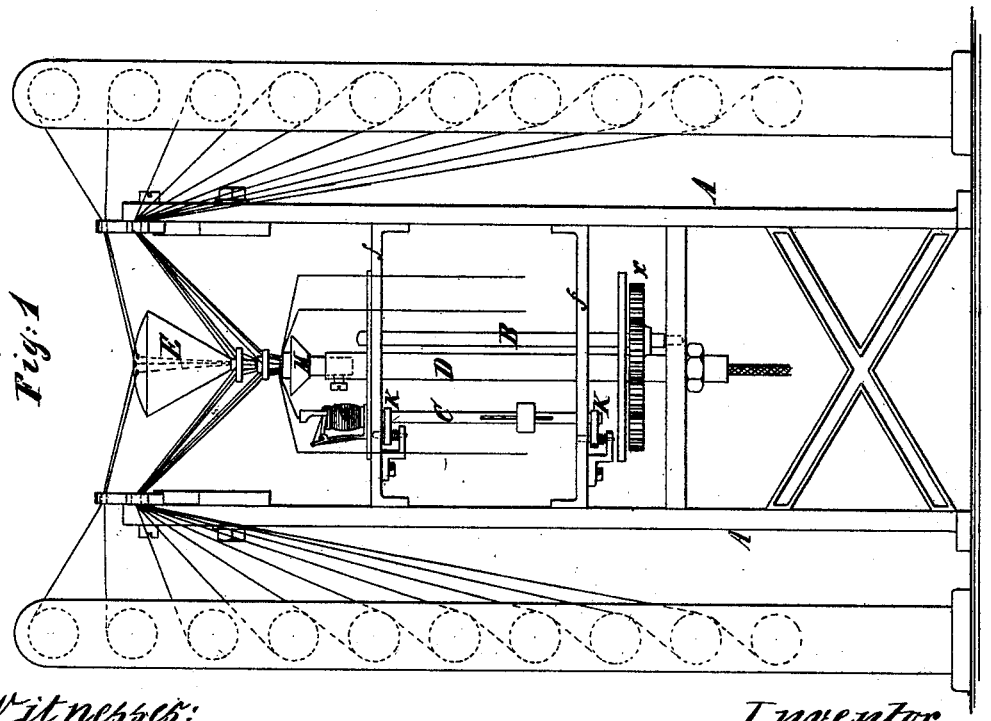


Fig. 1.



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2 Sheets—Sheet 2.

G. F. JAMES.
Braiding Machine.

No. 197,374. **Patented Nov. 20, 1877.**

Fig. 6.

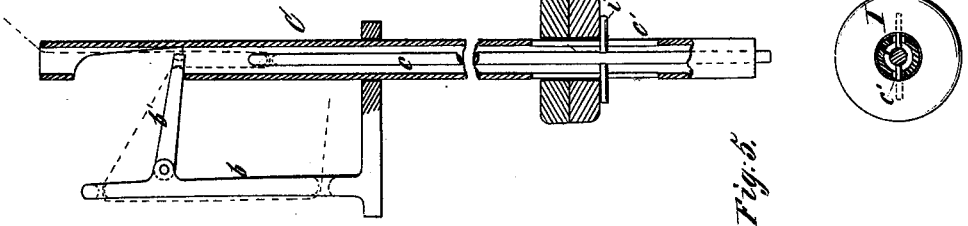


Fig. 5.

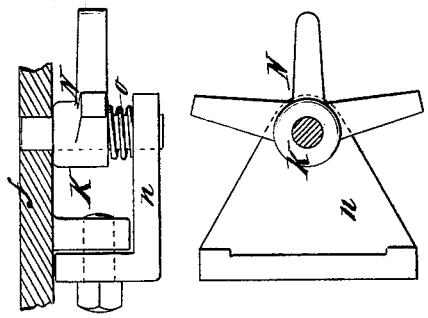


Fig. 4.

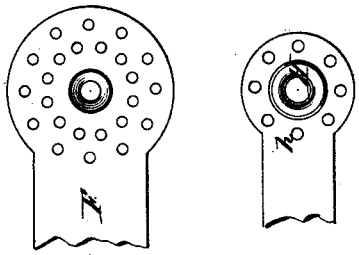
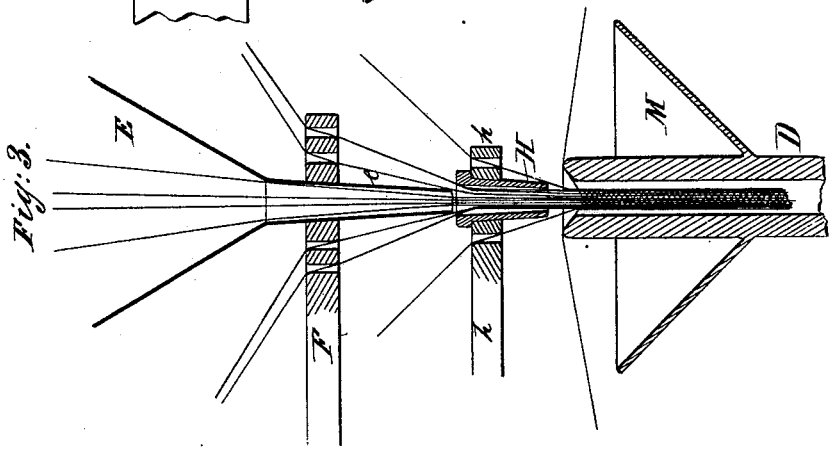


Fig. 3.



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UNITED STATES PATENT OFFICE.

GEORGE FREDERICK JAMES, OF MANCHESTER, ENGLAND, ASSIGNOR OF ONE-HALF HIS RIGHT TO WALTER TWISS GLOVER, OF SAME PLACE.

IMPROVEMENT IN BRAIDING-MACHINES.

Specification forming part of Letters Patent No. **197,374**, dated November 20, 1877; application filed June 26, 1877; patented in England, June 10, 1875.

To all whom it may concern:

Be it known that I, GEORGE F. JAMES, of the city of Manchester, county of Lancaster and Kingdom of Great Britain, have invented certain new and useful Improvements in Machines for Making Fuses, heretofore secured to me in England by Letters Patent No. 4,261, dated December 10, 1874; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and the letters of reference marked thereon, forming a part of this specification, in which—

Figure 1 is a front elevation; Fig. 2, a side elevation. Fig. 3 is an enlarged sectional view of a portion of the hopper and hollow spindle, showing the relative arrangement of the same and intermediate parts. Fig. 4 is a plan view of the adjustable supports for the hopper and conical tube, and showing the surrounding series of perforations. Fig. 5 is a side and plan view of the governors; Fig. 6, a side and plan view of a spindle and its attachments.

In order to enable others to understand my invention, I will first proceed to set forth the previous state of the art pertaining thereto, and subsequently to describe a machine embodying my improvements.

In machines for making fuses, as heretofore constructed, a vertical hollow central spindle is provided, through which the braided fuse is conveyed, and above which a hopper is arranged, containing the powder or other explosive compound required for filling the braided case. The spout of the hopper is extended within the hollow spindle, and one or more fibrous strands are drawn through the hopper and tubular braid to prevent the spout from clogging, and thereby insure a continuity of the train of powder within the fuse.

The braiding operation is performed by the well-known organization of devices employed in machines for making tubular braid, with the exception that the completed article is passed downwardly instead of upwardly as it leaves the machine.

In such machines the central vertical hollow spindle is surrounded with circular disks, provided with a series of apertures for the passage of the strands, so that their distance apart is regulated and uniformity in the braid secured.

Weights for keeping the strands taut have also been connected thereto and arranged within the hollow bobbin-spindles, and in such machines the top and bottom governors are connected together, and consequently the number of working-bobbins cannot be changed without the use of "dummies" or blank spindles.

My improvements consist in a novel manner of arranging the weights upon the bobbin-spindles, whereby the strands are kept taut.

In the drawings, A represents the frame of the machine, and B the vertical shafts, provided with spur-pinions *x*, for conveying motion to the operative parts. C are the spindles for supporting the bobbins *d*, which are arranged and operated in the same manner as in the ordinary circular braiding-machines. D is the stationary hollow central spindle, through which the braided material is conveyed; and E, the hopper, for containing the powder or other material for supplying the tubular braid.

The spout of the hopper is supported by the plate F, which is capable of adjustment upon the fixed bracket *a*. This plate F is provided with a series of perforations, arranged concentrically with the spout *e* of the hopper E, as seen clearly in the detached view, Fig. 4. These perforations are for the purpose of directing the strands in regular order from the creels to the central hollow spindle, the number of such strands varying according to the required size and texture of the braid. When all of such perforations are not occupied by the different strands, care should be taken to distribute the strands employed equally around the plate.

Duplicate plates, with a varying number of perforations, may be constructed and substituted when required.

H represents a conical tube, (which may be constructed of any required size or diameter,) mounted upon an adjustable plate, *h*, attached to the fixed bracket *a*. This conical tube is arranged vertically within a socket or opening in the adjustable plate *h*, which is provided with a series of perforations arranged concentrically with said tube, for directing the strands intended for an additional or the external coating of the braid. The interior or bore of the tube H is made conical, as shown in Fig. 3, in

order to gradually contract the strands passing through, and insure a close and solid texture of the fabric previous to the subsequent braiding operation.

One or more strands of cotton-yarn or other suitable fibrous substance are passed through the cover or body of the hopper, and through the powder or other material contained therein, to the interior of the braid, and, as the completed braid is drawn downward, such strands prevent the spout from clogging, and thus a continuous train of powder is supplied within the braid.

Weights I are arranged upon the exterior of the hollow spindles C, for keeping the strands leading from the bobbins taut. The weights I rest upon keys *i*, which pass through a slot, *c'*, in the spindle and a perforation in the wires *c*.

The strands leading from the bobbins *d* are directed through two apertures in the fliers *b*, then through eyes in the droppers *b'*, and through eyes in the wires *c*, from whence they pass, as usual, to the top of the spindles C and to the top of the hollow central and adjustable spindle D.

The governors K K are employed in pairs, and pivoted to the under side of the top and bottom plates *f f*, respectively, as shown in Fig. 1.

Each governor consists of a three-armed lever, N, pivoted to the plate and fixed bracket *n*. *o* represents a coiled spring placed between the bracket and lever, the object of which is to retain the lever in any desired position by the friction of said spring. A disk, M, is arranged and fixed upon the hollow central spindle D, to arrest any powder or other material that may escape from the hopper E.

The strands for forming the braid either in one or more layers may be composed of any suitable substance adapted to the purpose to which the fuse may be applied, such as cotton, jute, hemp, or other vegetable or animal fibrous substance, and the same may be wholly made of, or interwoven with, or covered by, strands of wire.

The material for forming the braid is wound upon creels arranged conveniently to the machine, as shown in Fig. 1. The strands are directed to the hollow central spindle, and as they pass into the said spindle the strands from the surrounding bobbins are braided therein by the well-known action of the same, and the completed fuse is conveyed downward through the hollow central spindle over the pulley L and draw-roller P, and is wound upon the removable swift R. Motion is communicated to the swift R by the endless band *r*, or by other suitable means.

Having thus fully described my invention, what I claim, and desire to secure by Letters Patent, is—

The stationary hollow spindle D, in combination with the conical tube H and perforated plate F, operating substantially as and for the purpose described.

G. F. JAMES.

Witnesses:
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JOHN J. ROYLE.