No. 769,845. PATENTED SEPT. 13, 1904.

M. O. STEERE & S. W. WARDWELL.

LOOM SHUTTLE.

APPLICATION FILED JAN. 15, 1902.

NO MODEL.

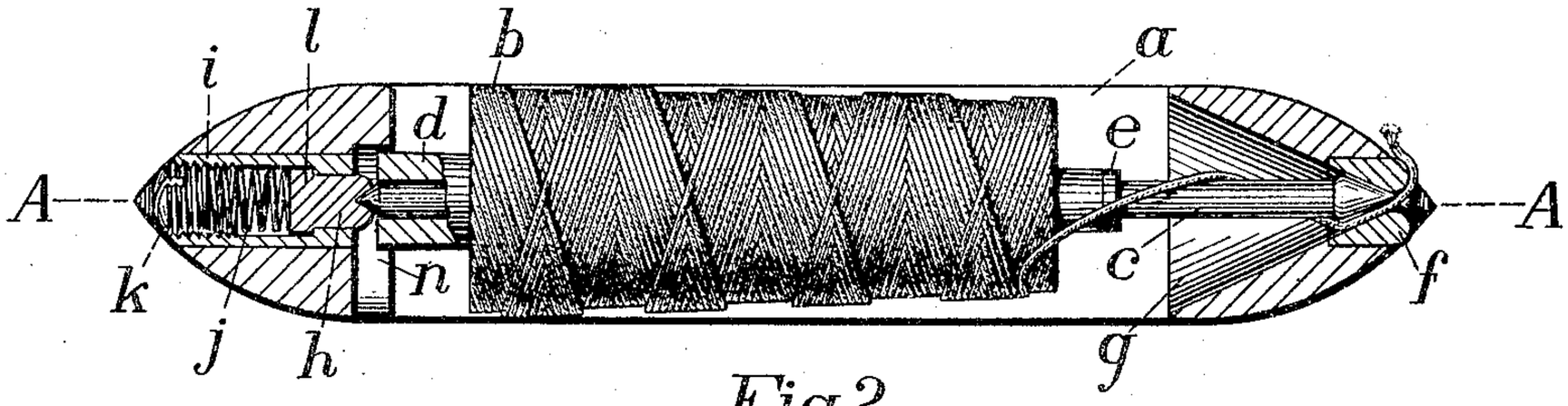

Fig. 2.

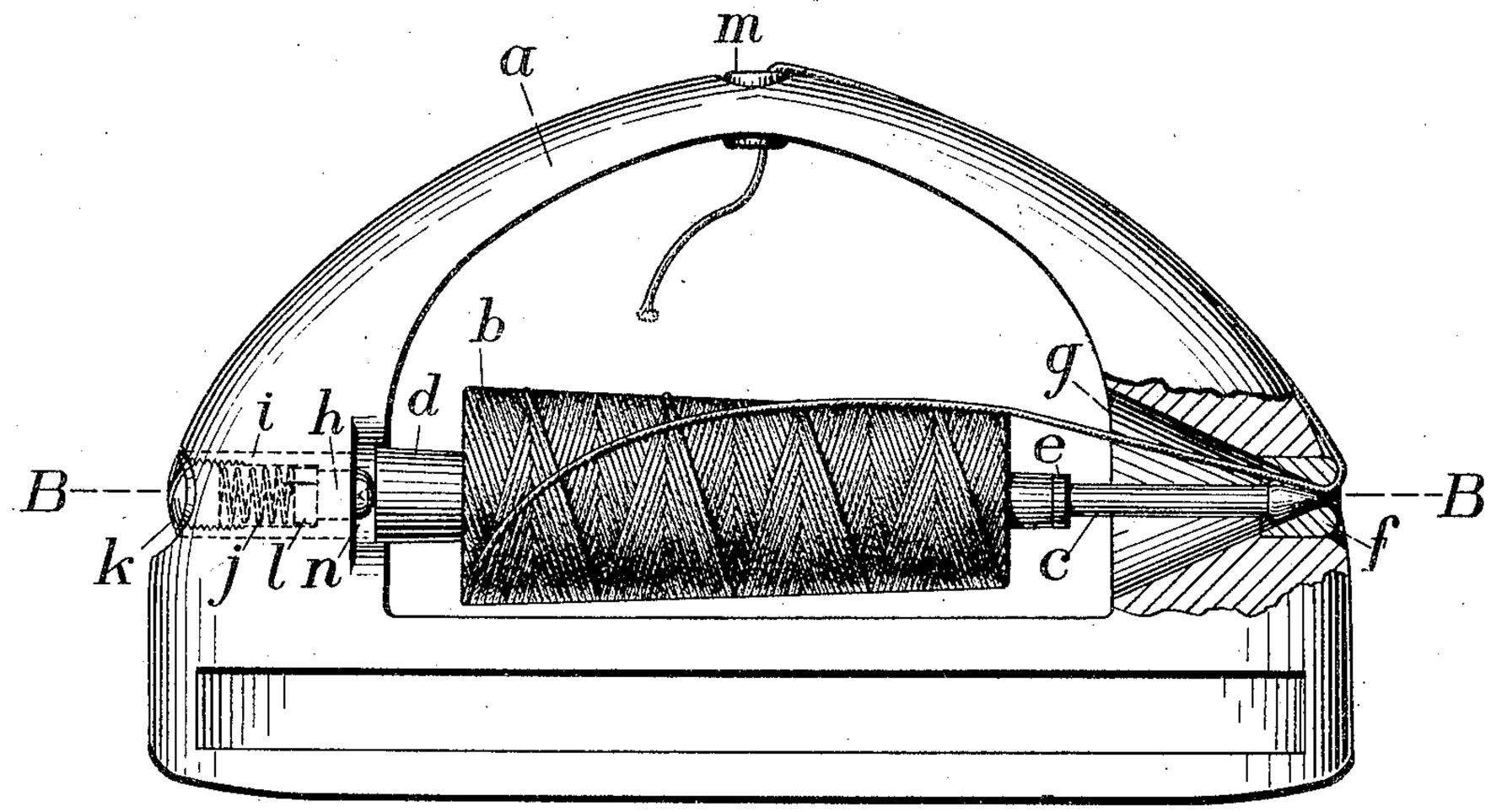

Fig. 1.

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No. 769,845. Patented September 13, 1904.

UNITED STATES PATENT OFFICE.

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LOOM-SHUTTLE.

SPECIFICATION forming part of Letters Patent No. 769,845, dated September 13, 1904.

Application filed January 15, 1902. Serial No. 89,901. (No model.)

To all whom it may concern:

Be it known that we, MERRILL O. STEERE, a resident of Pawtucket, and SIMON W. WARDWELL, a resident of Providence, State of Rhode Island, citizens of the United States, have invented Improvements in Loom-Shuttles, set forth in the annexed specification.

Our invention relates to improvements in loom-shuttles, particularly to the shuttles employed in webbing or "narrow-ware" looms.

The object of our invention is to produce a shuttle for narrow-ware looms from which the yarn may be withdrawn by unwinding it over the end of the quill or yarn-package instead of by unrolling the latter, thus eliminating the breakage, disturbance of tension, and other defects which inevitably occur when yarn is unwound by unrolling. In attaining this object we have also perfected certain improvements which may be advantageously used in connection with other shuttles than those employed on narrow-ware looms.

Our device is fully described in the accompanying specification and drawings, of which—

Figure 1 is a side elevation of the shuttle in part section on the line A A of Fig. 2. Fig. 2 is a horizontal section on the line B B, Fig. 1.

Our invention consists, essentially, of a shuttle so made that the yarn-package, (which we shall hereinafter for convenience term the "quill,") mounted on a movable spindle, shall deliver the yarn over the end of the quill and through an eye in the end of the shuttle and in devices whereby the yarn in passing through the eye in the end of the shuttle shall be tensionized by the action of the spindle on which the quill is mounted.

The shuttle *a* is of usual form, comprising an arch in which is mounted the quill *b* and a base in which are devices whereby the shuttle is reciprocated and guides to direct the reciprocation of the shuttle. Neither the reciprocating devices nor the guides are particularly described or illustrated, as they constitute no part of our invention.

The quill *b* is supported on the spindle *c*, with one end of the quill-tube *d* abutting the collar *e*, which latter limits any movement of the quill on the spindle toward the delivery-eye *f* in the end of the shuttle.

At the delivery end of the shuttle and on the inside of the arch is a conical or funnel-shaped recess *g*, at the apex of which is secured the delivery-eye *f*. The latter is made of suitable material, with the end adjacent the outer surface of the shuttle well rounded and smoothly finished that the least possible resistance may be presented to the yarn as it is drawn from the shuttle.

The inner end of the opening of the eye is flared to substantially match the taper of the recess *g* in the arch.

The purpose of the funnel-like approach to the eye *f* is to allow a maximum amount of yarn in the quill. Ample space is provided for unwinding even when the delivery end of the quill is closely adjacent the portion of the shuttle surrounding the eye *f*. The opening or recess *g* serves further as a guide to direct the quill-spindle to its seat and to aid in threading the yarn through the eye *f*.

The funnel-like opening in the eye *f* serves to receive the head of the spindle *c* and in conjunction therewith acts as a tension device to control the delivery of the yarn from the shuttle.

The end of the spindle *c* which is supported in the eye *f* is preferably enlarged and formed as a conical head, the bottom of which is well rounded and smoothly finished that it may present no undue resistance to the delivery of the yarn. The opposite end of the spindle is conically pointed to fit a depression or seat in the end of the plunger *h*. The end of the plunger is so formed that a lateral pressure of the spindle against it will force the plunger back and admit the spindle end to its center or seat in the end of the plunger. The taper of the spindle-point and the seat in the plunger are such that a direct lateral pressure will not readily remove the spindle from its seat. To remove the spindle, the plunger *h* is first pressed back, after which the spindle can be readily removed.

Leading to the plunger *h* is a guideway *n*,

cut in the inside of the arch and of a width to receive the end of the quill-tube *d*, so that when inserting a quill in the shuttle the end of the spindle *c* is guided directly to the plunger *h* and to its seat thereon.

The plunger *h* is mounted in the sleeve *i*, which in turn is mounted in the shuttle-arch. In the sleeve are two axial bores, one of relatively small diameter and corresponding to the body of the plunger *h*. The other, of larger diameter, forms a chamber in which the spring *j* is secured by the screw *k*. The spring bears on the end of the plunger *h* to protrude its extremity beyond the end of the sleeve *i*. The plunger is limited in its movement, under the action of the spring *j*, by its head *l*. The screw *k* serves not only as a closure for the sleeve *i*, but also to adjust the degree of pressure of the spring *j*, and with it the tension on the yarn.

The quill employed with this shuttle is preferably wound in the manner shown in single or multiple sections in Letters Patent to S. W. Wardwell, No. 653,718, on a tube of suitable material, but preferably is of slightly conical form to facilitate the delivery of the yarn over its end, the yarn delivering freely in this way when so wound. The quill is mounted on the spindle *c*, with the end of smaller diameter adjacent the collar *e*. The yarn is passed through the eye *f*, the head of the spindle *c* is placed in its seat in the eye *f* against the yarn, and the opposite end of the spindle is snapped into its seat in the plunger *h*. The yarn passes from the eye *f* at the end of the shuttle up around the outer surface of the arch *a*, following a groove therein, and thence down through the eye *m*, being delivered from the under side of the eye *m* to the weaving. The yarn as it delivers through the eye *f* revolves continually about the head of the spindle *c*, so that there is no wear in any one part thereof, insuring constant and uniform tension, long life for the spindle, and against injury to the yarn.

We are aware that tension devices have been proposed for shuttles in which the yarn should pass between a cup and a cone or their equivalents; but no provision has been made for shifting or permitting the yarn to continually shift in its position, thereby uniformly distributing the wear on both tension members. Where no such provision is made, the yarn tends to wear a groove in both members, which when of a certain depth permits the two to come together. When this occurs, the shuttle is not adapted for use with different sizes of yarn. The channel worn by a relatively fine yarn will be too small to admit one of larger size, and a fine yarn will pass through the channel cut by a larger yarn, as through an eye, and, further, a channel cut in this manner is liable to have sharp edges, which will abrade and injure the yarn.

Heretofore the shuttles employed in narrow-ware looms have been constructed for use with a quill from which the yarn can be unwound only by unrolling and the use of which is attended with serious inconveniences and defects. Rotating supplies are subject to the influence of momentum and inertia. If the yarn is fine and delicate and the mass to be rotated relatively large, there is danger that the yarn will be broken or strained in overcoming the inertia of the mass to start the latter rotating. In any event the sudden pull of starting produces a momentary increase of tension that affects the fabric into which the yarn enters. The rotation of the quill having been started, it will not stop when it should, but loosens a certain amount of yarn from the quill, which if it does not tangle is delivered to the weaving with almost no tension, but which is liable to fall over the end of the quill and wrap around the tube and the spindle, causing increased tension or breakage. The shuttle action of narrow-ware looms is quick and sharp, and therefore the effects of momentum and inertia are particularly marked. Their effect has been somewhat reduced and controlled by spring take-ups introduced in the shuttles, but only to a slight extent. Limited in their range of action, these devices were ineffective to maintain the tension on the yarn uniform. They were frail and easily deranged, and therefore frequently non-operative, and, further, they were not readily threaded. To effectively eliminate these difficulties, the yarn must be unwound over the end of the quill, thus eliminating the effects of momentum and inertia due to rotating the whole mass of yarn contained in the shuttle and substituting therefor the momentum and inertia of only that small portion of yarn being unwound. To accomplish this has heretofore been impracticable because of the limited size and capacity of the shuttles and because with the old methods of winding and arrangement of the shuttles a quill which could be unwound over its ends would contain so little yarn that its employment would not be economical.

We are aware that shuttles for narrow-ware looms have heretofore been employed in which the yarn delivered over the end of the quill. This form of delivery, however, has been limited to shuttles of the largest size. On account of the space required between the delivery end of the quill and the end of the shuttle the amount of yarn in the quill is necessarily limited and the product of the loom eventually curtailed. Because of the funnel-shaped opening before referred to our shuttle will contain much more yarn than has heretofore been carried in a shuttle of the same size and will deliver it freely with uniform tension.

Without limiting ourselves to the precise form of structure illustrated, we claim—

1. A loom-shuttle provided with a quill, a removable spindle on which the quill is mount-

ed, means for supporting the spindle by both ends in such manner that the yarn can be drawn over the end of the quill, and an eye to which the yarn passes from the quill.

2. A loom-shuttle provided with a delivery-eye, and a cone-shaped member extending into said eye to apply friction to the thread passing between said member and the eye, and so related to the eye that as the thread passes through the latter, it continuously revolves about said cone-shaped member.

3. A loom-shuttle provided with a delivery-eye, means for supporting a cop in a stationary position axially in line with the eye, and a cone-shaped member extending into said eye to apply friction to the yarn passing between said member and the eye while permitting the yarn to revolve round said member substantially as set forth.

4. A loom-shuttle provided with a delivery-eye, a cone-shaped member for supporting the quill, and means for carrying the yarn through the eye and in contact with the said member, the parts arranged to deliver the yarn with a revolution around the cone-shaped member and to impart friction thereto, substantially as described.

5. The combination in a loom-shuttle with a quill-spindle, of an eye through which the yarn passes and in which one end of the quill-spindle is supported, and devices to support the opposite end of the spindle and act upon the latter to cause it to restrain and control the delivery of the yarn from the shuttle.

6. A quill-spindle for "narrow-ware" loom-shuttles, conically pointed at one end, having an enlarged and substantially conical head at the opposite end and intermediate the ends, a collar to locate the quill on the spindle.

7. A loom-shuttle *a* having an interior conical recess *g* at one end of the shuttle, and at the apex of said recess an eye *f* with a corresponding conical opening at its inner end, a spring-plunger *h* mounted at the opposite end of the shuttle in a sleeve *i*, and a guideway *n* formed in the arch and leading to the plunger, a spring *j* to press the plunger and protrude it from the sleeve, permitting it to be pressed back as required, a screw *k* to hold the spring in the sleeve and to adjust its tension, and a quill-spindle *c* having a head fitted to the eye *f*, its opposite end fitted to a seat in the plunger *h* and with a collar *e* to limit the quill in its position and movement on the spindle, all for the purpose and in the manner substantially as described.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

MERRILL O. STEERE.
SIMON W. WARDWELL.

Witnesses:
CHARLES A. EDDY,
EDWIN C. SMITH.