J. M. PALMER & C. A. SHAW.

Loom-Shuttle.

No. 210,874. Patented Dec. 17, 1878.

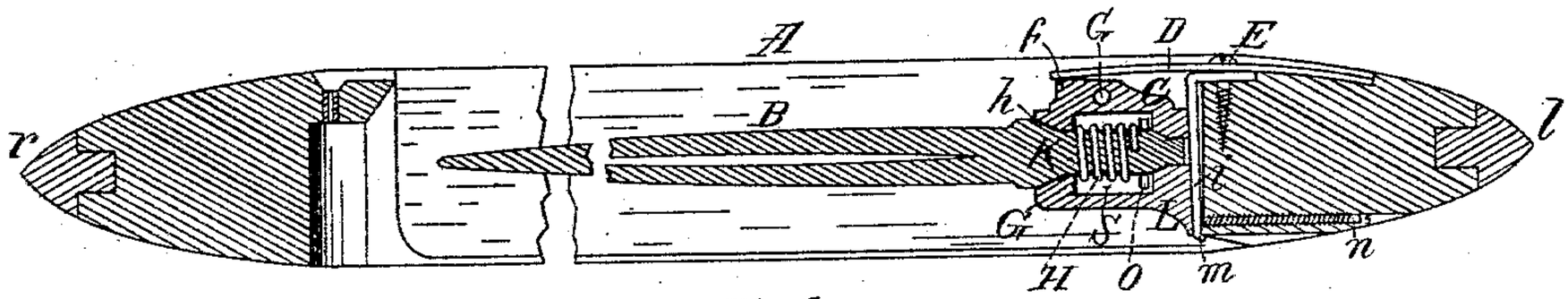

Fig. 1.

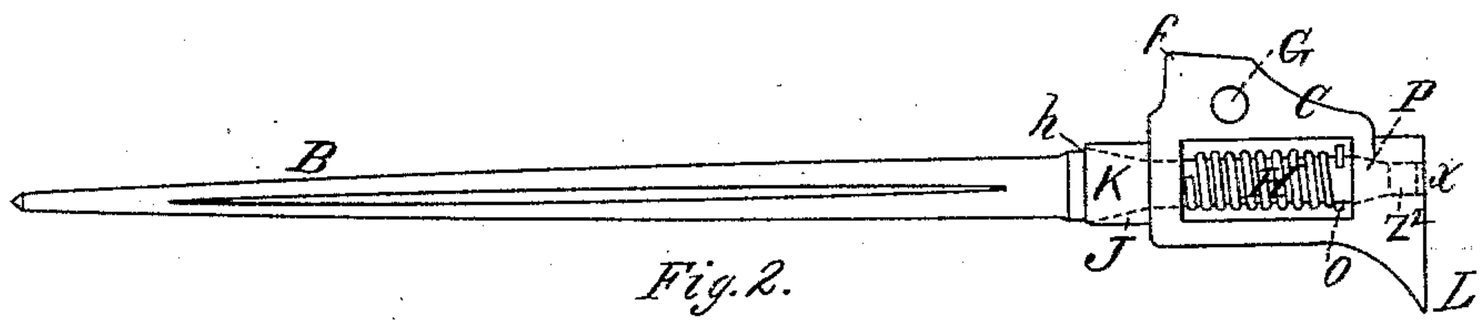

Fig. 2.

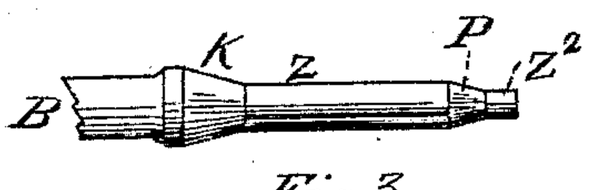

Fig. 3.

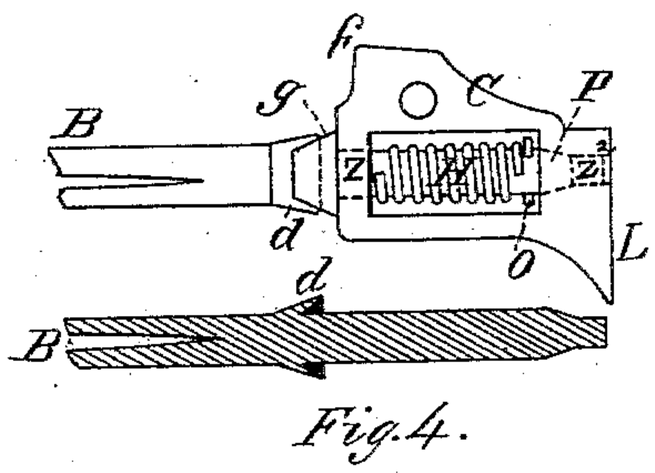

Fig. 4.

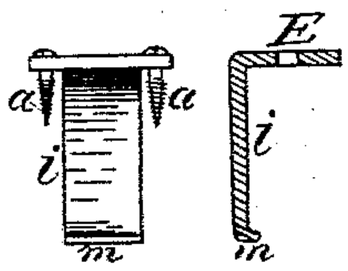

Fig. 5.

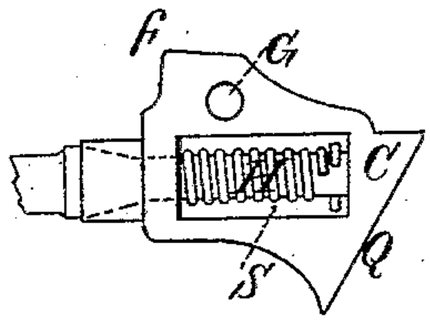

Fig. 6.

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UNITED STATES PATENT OFFICE.

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IMPROVEMENT IN LOOM-SHUTTLES.

Specification forming part of Letters Patent No. **210,874**, dated December 17, 1878; application filed April 22, 1878.

To all whom it may concern:

Be it known that we, JAMES MONROE PALMER, of Cambridge, in the county of Middlesex and State of Massachusetts, and CHARLES ALBERT SHAW, of Salem, in the county of Essex and State of Massachusetts, have invented certain new and useful Improvements in Loom-Shuttles, of which the following is a description sufficiently full, clear, and exact to enable any person skilled in the art or science to which our invention appertains to make and use the same, reference being had to the accompanying drawings, forming a part of this specification, in which—

Figure 1 is a vertical longitudinal sectional view of our improved shuttle; Fig. 2, a side elevation of the spindle and spindle-head detached; Fig. 3, a side elevation of the spindle-shank; Fig. 4, a sectional view, showing an alternate form of construction for the spindle and spindle-head; Fig. 5, a view of the adjusting-spring or face-plate; and Fig. 6, a sectional view, showing an alternate form of construction for the spindle-head.

Like letters of reference indicate corresponding parts in the different figures of the drawings.

Our invention relates principally to that class of loom-shuttles which are employed in what is known as "cop-weaving," and in which the spindle is provided with a spring for preventing the cop from being accidentally detached from the spindle either by the percussive blows of the picker-staff on the shuttle or by the concussion which occurs in suddenly stopping the shuttle at the end of its throw; and consists in a novel construction and arrangement of the parts, all as hereinafter more fully set forth and claimed, by which a more effective device of this character is produced than is now in ordinary use.

All practical weavers are aware that in the use of ordinary shuttles much difficulty is experienced in preventing the cop from becoming accidentally detached from the spindle or displaced thereon by the percussive blows of the picker-staff on the shuttle, and the concussion which occurs in suddenly stopping the shuttle at the end of its throw, such accidental displacement or detachment of the cop resulting in a large waste of the thread or yarn. To overcome this difficulty spindles have been fitted to slide or work longitudinally in straight bearings formed in the spindle-head of the shuttle, and provided with a spring for taking up or neutralizing the bad effects of the blows and concussion referred to; but it has been found that when all of the bearing-surfaces of the shank, or that portion of the spindle which works in the spindle-head, are in parallelism with the axial line of the spindle, the bearings in the spindle-head soon become worn by the vibratory movements of the spindle, causing it to work loose, and permitting it to drop below its proper position in the body of the shuttle, thus increasing the waste and producing poor work.

To remedy the bad effects of the wearing away of the shank of the spindle and bearings in the spindle-head, as described, is one of the principal objects of our improvement, and this we accomplish by the employment of a cone on the spindle and a corresponding conical socket or bearing for the cone in the spindle-head, the cone being drawn or forced into its socket by the same spring which acts to take up or neutralize the blow of the picker-staff, thus centering the spindle, and keeping it in such a position as to enable the shuttle to do good work even after the straight bearings have become greatly worn. We also sometimes employ an auxiliary cone and socket at the outer end of the shank to assist the main cone; but this may be dispensed with if desired.

In the drawings, A represents the body of the shuttle; B, the spindle; C, the spindle-head; D, the spindle-head spring, and E the screw by which the spring is secured to the heel of the shuttle. The spindle-head is pivoted or journaled in the ordinary manner on a pin passing laterally through the body of the shuttle and hole G, the inner end of the flat spring D pressing on the upper side of the head at the projection *f*.

The body of the spindle-head is provided with a lateral opening or rectangular slot, S, and is also drilled longitudinally to receive

the shank of the spindle B. It is also provided with a horizontally-projecting stud or nipple, J, at its forward end, and with a downwardly-projecting lug or dog, L, at its rear.

The shank of the spindle should be integral with the body, and consists of the main cone or taper K, the straight part or bearing Z, the auxiliary cone or taper P, and straight part or bearing Z^2, and is preferably formed by turning down this section of the spindle into shape, as shown. The cone or taper K is larger than the cone or taper P, and the straight portion Z is longer, and also has a greater diameter than the straight portion Z^2, the object of this being to enable the shank to be readily inserted in the spindle-head.

The cone or taper K is fitted to work in a corresponding conical socket or tapering bearing, *h*, within the stud or projection J, the auxiliary cone P being also fitted to work in a like socket or bearing in the opposite end of the spindle-head. The straight bearings Z Z^2 are also fitted to work nicely in corresponding straight bearings in the spindle-head.

A section of the straight part Z of the shank of the spindle is not used as a bearing, and disposed around this section within the slot S there is a coiled spring, H, one end of which abuts against the spindle-head at the forward end of the slot, the other resting against the pin O, which passes through the part Z, the pin being preferably of a such a length as to prevent the spindle from entirely revolving in either direction.

A spring or face-plate, *i*, provided with a lip, *m*, has its upper end secured to the heel of the shuttle beneath the spring D by means of the screws *a a*, and projects downwardly over that portion of the shuttle against which the lug or dog L abuts or strikes when the spindle B is in position for use. It is not absolutely necessary, however, to extend the plate beneath the spring D, as it may be secured to the heel of the shuttle at some other point at the rear of the spindle-head, although the arrangement shown is preferable. When the spindle is elevated, and the dog is swung out of contact with the plate, the plate may be readily pushed or swung forward, and thin pieces or lifts of paper or other material inserted beneath the same, where they will be securely retained by the lip *m* without the aid of cement, and thus the compression or wearing away of the wood at this point caused by the action of the spindle-head may be easily and effectually compensated, as required. The plate is also provided with a set-screw, *n*, which may be used in lieu of the paper lifts; but the lifts are preferable, and the screw may be dispensed with if desired.

In the use of our improvement the spindle B is raised, and the cop slipped carefully but firmly onto the same. It is then depressed until the dog L comes into contact with the plate *i*, in which position it will be held by the spring D pressing upon the upper side of the spindle-head at the projection *f*, the pressure of the spring being regulated by the screw E. The shuttle may now be threaded up, placed in the race or box, and power applied to the loom in the usual manner.

When the picker-staff strikes the shuttle—for instance, at *l*—throwing it across the web as it arrives at the end of its course or throw, the usual sudden stoppage or concussion will tend to detach the cop from the spindle. When the motions are reversed, and the picker-staff strikes the shuttle at *r*, the tendency will also be to detach the cop. To overcome this tendency or defect the spindle is fitted to slide longitudinally in the spindle-head, and is provided with the spring H and pin O, as shown. When the body of the shuttle traveling in a direction from *l* to *r* arrives at the end of its throw, and its motion is suddenly arrested, the momentum acquired by the spindle will cause it to continue a short distance on its course after the shuttle has stopped, the pin O acting against the spring H to compress it in the slot S, thus gradually taking up or neutralizing the effects of the concussion. When the motion is reversed and the picker-staff strikes the body of the shuttle at *r*, throwing it suddenly in the direction of *l*, the spring H will be again compressed in overcoming the inertia of the spindle, and thus take up or neutralize the percussive blow of the picker-staff and prevent the cop from being detached thereby, all in a manner which will be readily obvious without a more explicit description.

As previously stated, the cones or tapers K P and the conical sockets or bearings in which they work constitute an important feature of our invention, although the cone P and its socket are merely auxiliary to the cone K, and may be dispensed with if desired.

When the shank of the spindle has straight bearings only, as at Z Z^2, whether the bearings are of equal size or not, the vibratory movements of the spindle will soon cause the shank at its bearing parts to wear rapidly, and also the hole through the spindle-head in which the shank works to become worn away and enlarged, especially at that part of the spindle-head nearest the point of the spindle, thereby loosening the spindle in its head, and rendering the shuttle unfit for doing good work. The evil effects of this wearing away of the journals of the spindle are entirely overcome by the cones K P and their conical sockets, the expansive action of the spring H drawing or forcing the cones into their sockets at each throw of the shuttle, thereby centering the spindle and keeping it in a proper working position.

An alternate method of constructing this portion of our improvement is shown in Fig. 4, the stud J being formed into a conical frustum, *g*, a corresponding conical socket, *d*, being attached to the spindle; but the form shown in Figs. 1 and 2 is considered preferable.

An alternate form for the spindle-head is also shown in Fig. 6, in which the dog or lug

L is inclined, as seen at Q, and when this form is used the plate *i* and surface on which it rests must be inclined to correspond. The end *x* of the shank of the spindle does not come flush with the rear face of the spindle-head, thus permitting the cones K P to wear or settle longitudinally in their sockets without bringing the end into contact with the plate *i*.

The spindle-head being provided with the dog L, located at its extreme rear portion, and having a vertical face at right angles to the axis of the spindle, serves to keep the spindle more securely in position, and does less injury to the wood of the shuttle than any other form of spindle-head of which we have any knowledge.

The spindle B is preferably slotted or split lengthwise through its center, as shown, and the shuttle, in other respects than those described, is of the ordinary construction.

Our improved shuttle is well adapted for weaving either cotton, woolen, silk, or other fibrous materials, and will effect a very large saving in waste over any other now in use.

Having thus explained our invention, what we claim is—

1. The spindle-head C, provided with the conical socket *h*, arranged concentrically with the hole or bearing in which the spindle-shank works, the spindle B, provided with the cone K, arranged concentrically with the shank of the spindle, the spring H, and pin O, all combined and arranged to operate substantially as and for the purpose specified.

2. In combination with the cone K, arranged concentrically with the shank of the spindle, the auxiliary cone P and its conical socket, substantially as and for the purpose set forth.

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