(No Model.)

W. B. DOUGLAS.

SPINDLE BEARING.

No. 473,214. Patented Apr. 19, 1892.

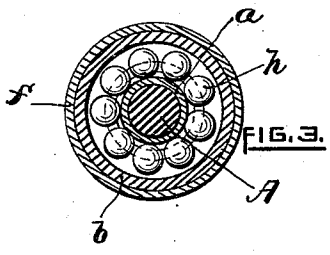

FIG. 3.

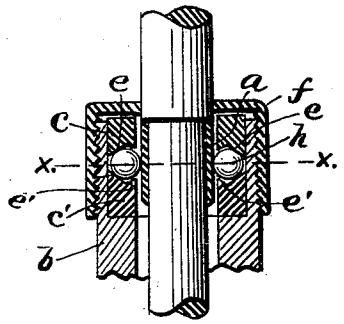

FIG. 2.

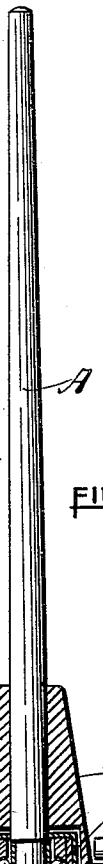

FIG. 1.

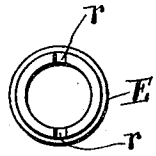

FIG. 5.

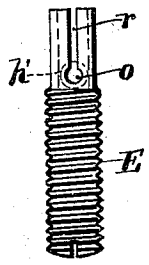

FIG. 4.

WITNESSES.

Charles H. Kinnigan

Thaddeus A. Kidd

INVENTOR.

William B. Douglas

By Benj. Arnold Atty

UNITED STATES PATENT OFFICE.

WILLIAM B. DOUGLAS, OF PHENIX, RHODE ISLAND.

SPINDLE-BEARING.

SPECIFICATION forming part of Letters Patent No. 473,214, dated April 19, 1892.

Application filed July 29, 1891. Serial No. 401,037. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM B. DOUGLAS, of Phenix, in the county of Kent and State of Rhode Island, have invented certain new and useful Improvements in Spindle-Bearings; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to that class of spindles and their bearings used in working textile material, and is designed for the purpose of attaining a higher rate of speed with greater steadiness of operation and advantages in relation to keeping oiled in the bearings, without liability of oiling the textile product, and further, in reducing the amount of power required to operate them. It is fully illustrated in the accompanying drawings, wherein—

Figure 1 shows the spindle and step in elevation, with the other bearings and parts in immediate connection therewith in vertical cross-section. Fig. 2 is an enlarged representation of the upper bearing in vertical section with a part of the spindle in elevation. Fig. 3 is a horizontal cross-section of the parts taken on a line $x\,x$, Fig. 2. Fig. 4 is an elevation of the step E, taken from one side of the representation of the step in Fig. 1. Fig. 5 shows a top view of the step E enlarged.

In the drawings, A is the spindle, the upper part of which, from the shoulder resting on the bushing *a* to the top, may be made with nearly straight parallel sides, or having a well-defined taper, according to the kind of textile-machine it is to be used in, and from said shoulder down to the lower end it is made with almost parallel sides, with just a slight taper to facilitate the application to the spindle of the bushing *a*, which consists of a piece of steel tube, preferably hardened, tempered, and shrunk onto the spindle against the shoulder permanently.

D is a tubular support to hold the upper or bolster bearing and the lower bearing or step and secure the whole to the rail B, which is clamped in between the enlarged upper part of the tube and a nut C, fitted to a thread made on the body of the tube by screwing the nut up against the rail. The hole through the tube D is made considerably larger than the diameter of the lower part of the spindle and the upper end is recessed out still larger to receive a tube *b*, which is held fast in the recess, or the two tubes D and *b* may be made in one piece, if it is preferred to have the two of one kind of metal. The upper inner surface of the tube *b* has a circumferential groove or recess to receive two rings *c c'*, the lower one of the two *c'* resting in the shoulder shown and being fitted tightly into the bottom of the recess and the upper one *c* fitted so as to just slide into the recess without binding. The upper face of the lower ring and the lower face of the upper ring have V-shaped grooves made in them. (See Fig. 2.) The outer incline *e* of the grooves is made at about an angle of forty-five degrees with the outer side of the rings, and the inner incline *e'*, which is narrower, is made at about an angle of sixty degrees from the inner side of the rings, the grooves being the same in both rings. These grooves are for the purpose of holding a circle of hard-metal balls *h*, (see Fig. 3,) against which the hardened bushing *a* bears in running. For the purpose of confining and adjusting these balls *h* a cap *f* is fitted to screw down on a thread on the end of the tube *b*, by means of which the two rings can be pressed together, so as to force the balls toward the spindle, the difference in the angles of the two sides of the grooves causing the balls to rest against the outer sides of the grooves without touching the lips or inner sides of the grooves, which allows the balls to approach the spindle when the rings are pressed together, the lip formed by the inner side of the groove being only for the purpose of preventing the balls from falling down into the tube whenever the spindle is taken out. The balls *h* and rings *c c'* are preferably made hard, like the tube *b*.

The step E has a screw-thread cut on it for the greater part of its length, which fits into a screw-thread cut in the lower part of the tube D, and by turning the step around when in the tube it is raised or lowered to adjust it to the proper height. The upper part of the step E is turned down smaller than the bore of the tube D, so as to leave a space between it and the tube, and a hole is made in its up-

per end to receive the lower end of the spindle A, which is fitted to just turn in the step. A hole *o* is bored in from two opposite sides, near the bottom of the hole, in the end, and slots *r* are cut from the upper end down to the hole *o*, (see Fig. 4,) the object of the holes *o* and slots *r* being to allow the oil, with which the chamber in the tube D around the spindle is filled, to have free access to the whole surface of the spindle in the step, and to further lessen the friction the lower end of the spindle is made with a flat surface and a hardened metallic ball *h'* is put in the hole under the end of the spindle for it to turn on.

A whirl or band-pulley H is made fast on the spindle A, usually by being driven on, and is recessed at its lower end to pass down over the bearing, so as to bring the groove *p* for the reception of the band a little below the bearing of the bushing on the balls *h*, and a guard-wire *i* has its lower end screwed into the flange of the tube D and its upper end bent over to just clear the top of the pulley H to prevent the spindle from being pulled up out of the bearings when the bobbin is pulled off in the operation of doffing. A tube *j* is inserted in one side of the head of the tube D, through which oil is passed to the space around the spindle, which is filled up to about the level of the balls *h*, and a cap 20 is fitted over the end of the tube *j* to keep out all lint and dust. When the space in the tube D is once filled with oil, it will last for a long period, as there is no tendency or opportunity for the oil to escape, and at the same time it has free access to all the bearing-points. This, with the great reduction of the usual friction by the use of the balls, makes the spindle capable of running at a very high rate of speed above anything hitherto attained. The nicety of adjustment of the balls to the spindle by means of the grooved rings *c* and screw-cap *f* insures a perfect steadiness of motion, without which a high rate of speed is practically useless.

When the step E has been adjusted for height by turning it around in the tube D, as before described, it may be secured in that position by screwing up the check-nut *n* against the lower end of the tube D.

Having thus described my improvements, I claim as my invention and desire to secure by Letters Patent—

1. In a bearing for a spindle, the combination of two rings placed one above the other in a tube to hold a circle of balls between them, said rings each having a V-shaped groove recessed in their contiguous faces to form a lip extending partially over the inner surface of said ring of balls to retain them in place when the spindle is removed, with said balls and tube, substantially as specified.

2. In a step for a spindle, the combination of a cylindrical piece of metal having a screw-thread on a portion of its surface and a recess in its upper end fitting closely to the lower end of the spindle and having one or more slots or openings made through the sides of the recess, a ball of proper size to move freely in the bottom of said recess, with an outer supporting-tube having a screw-thread in its lower end to receive the threaded portion of said cylindrical piece, substantially as described.

WILLIAM B. DOUGLAS.

Witnesses:
BENJ. ARNOLD,
THADDEUS A. KIDD.