D. H. RICE.

Improvement in Spindles for Spinning-Machines.

No. 131,705. Patented Sep. 24, 1872.

Fig. 2.

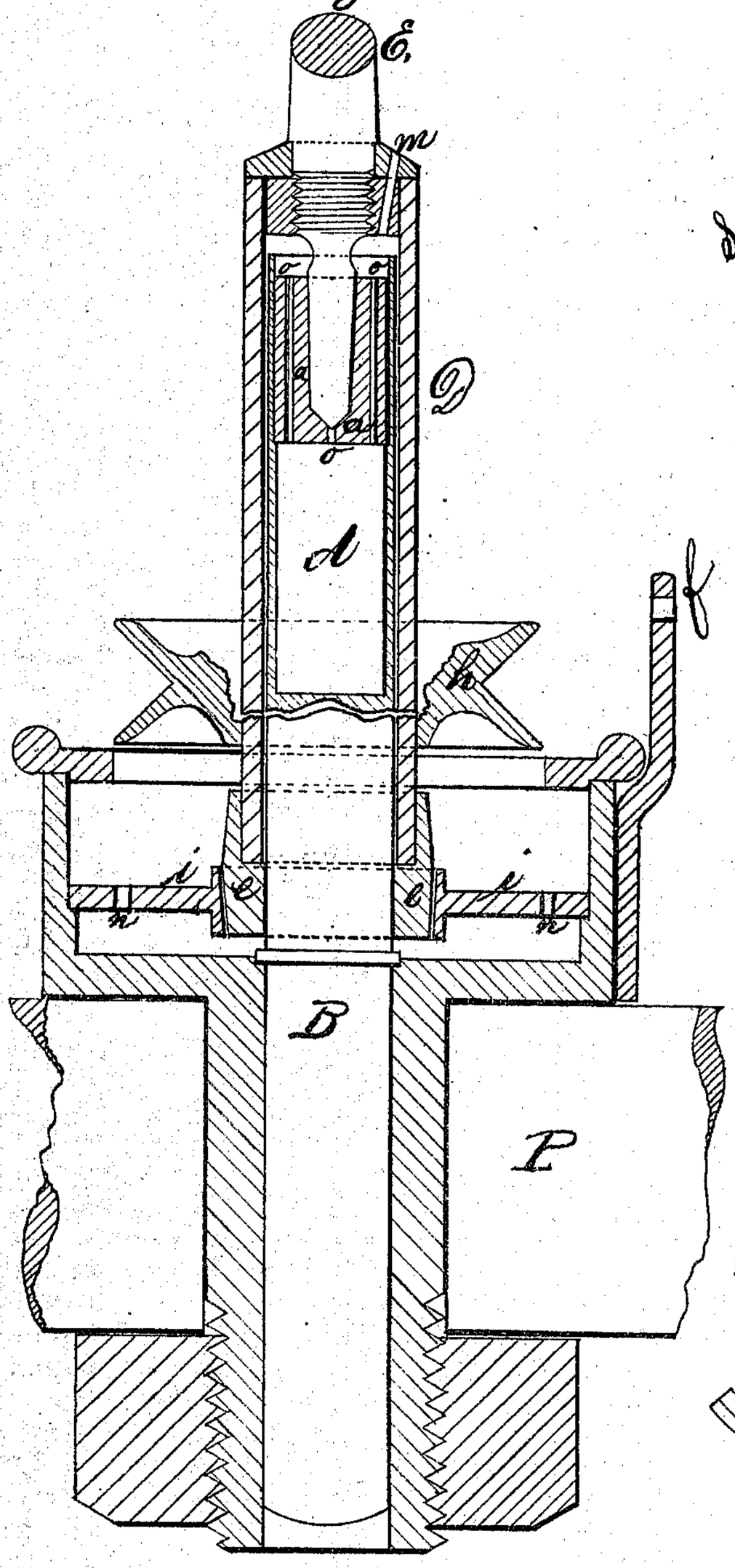


Fig. 3.

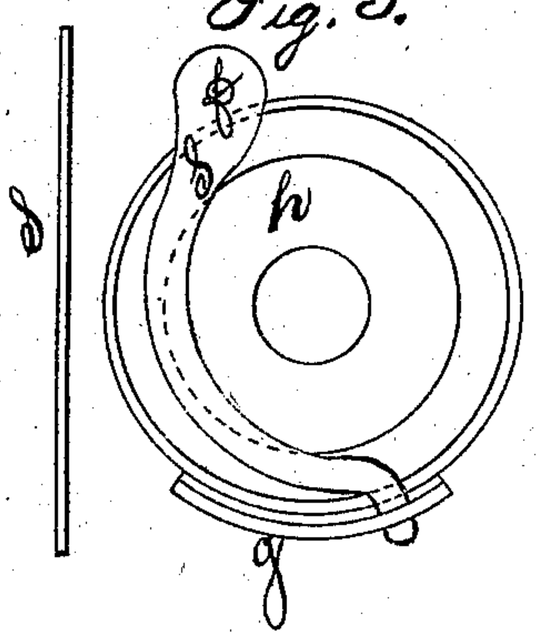
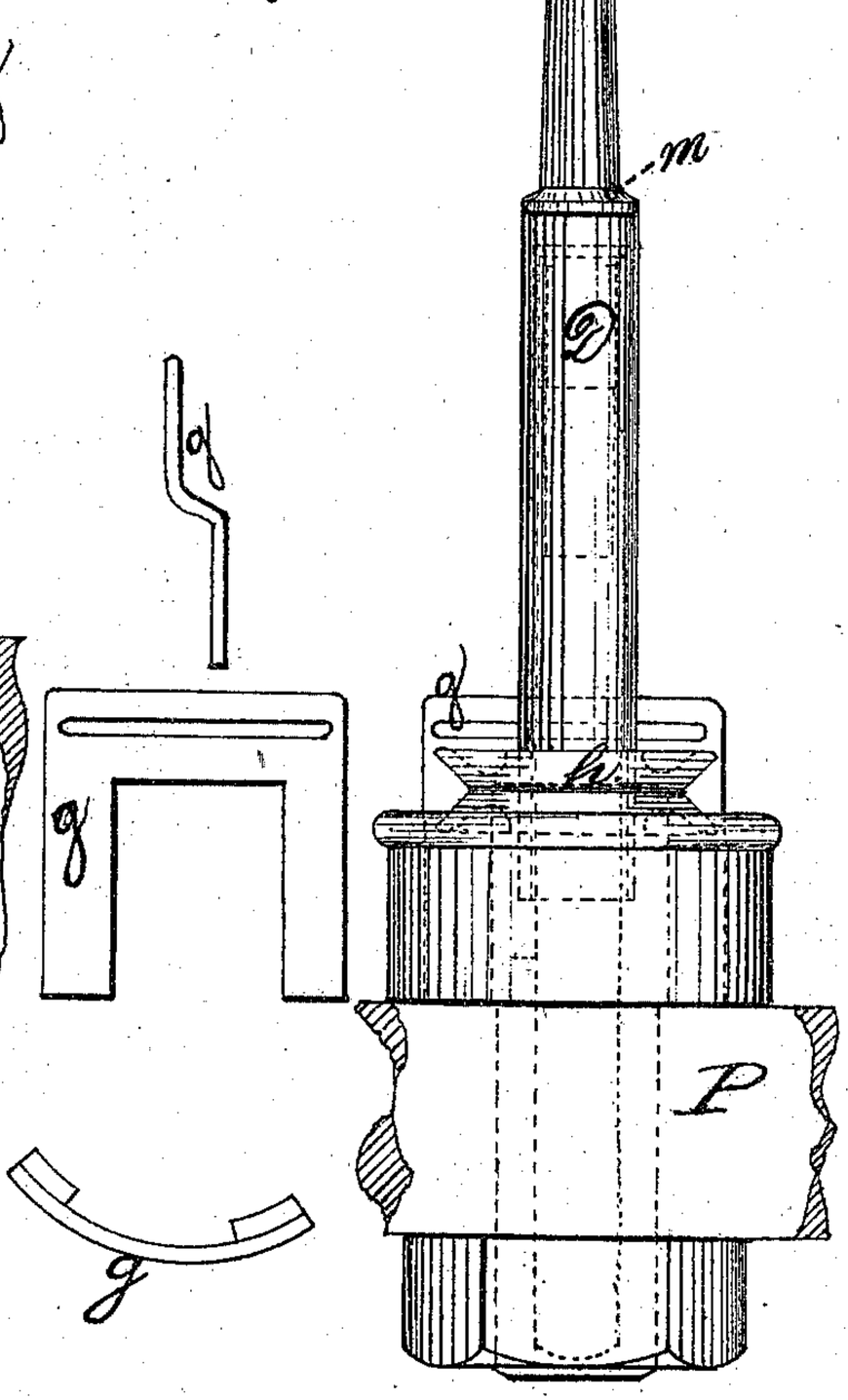


Fig. 1.



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UNITED STATES PATENT OFFICE.

DAVID HALL RICE, OF LOWELL, MASSACHUSETTS.

IMPROVEMENT IN SPINDLES FOR SPINNING-MACHINES.

Specification forming part of Letters Patent No. **131,705**, dated September 24, 1872.

To all whom it may concern:

Be it known that I, DAVID HALL RICE, of Lowell, in the county of Middlesex and Commonwealth of Massachusetts, have invented certain Improvements in Ring-Spinning, Throstle, and other Spinning-Frames, of which the following is a specification:

My invention relates, first, to the combination of a compound live spindle, partly hollow and partly solid, with a dead or stationary spindle, in the manner hereinafter described, so as to secure the greatest possible strength and lightness in the live spindle with the smallest bearings, as well as perfect steadiness of the dead spindle; second, to combining with the upper bearing of the live spindle an automatic lubricating arrangement, such as hereinafter described, having its oil-chamber in the upper part of the dead spindle, whereby the upper bearing of the live spindle is automatically lubricated; third, to forming the lower bearing of the live spindle of a separate piece of metal or ring and driving it on the live spindle, and also to forming the upper bearing-step of a separate piece of metal driven into its socket, both being removable without injury to the live and dead spindles, the object being to remove the lower bearing and the upper bearing step when worn out and replace them with new ones at trifling expense, enabling me to use the same live and dead spindles with several successive sets of bearings instead of throwing aside the entire spindle each time the bearing is worn, as heretofore done; fourth, to placing the upper bearing of the live spindle within the hollow portion thereof, and longitudinally central, or nearly so, to the live spindle and the bobbin which it carries, the object being by this arrangement to aid in resisting the draft of the thread upon either end of the bobbin and spindle, as hereinafter described; fifth, to placing in the lower oil-reservoir a horizontal plate of considerable thickness, having a central hole in it, in which the lower end of the live spindle rotates without touching the plate, the object being to prevent the spindle from throwing the oil away from the lower bearing, or even out of the reservoir. Said plate is placed so as to leave a space between it and the bottom of the reservoir, and has holes through it, around the central hole through which the oil flows to the lower bearing of the live spindle.

Figure 1 is an elevation of a spindle embodying my invention. Fig. 2 is an enlarged vertical section of the material parts of the same. Fig. 3 is an end view of the spindle from above, showing the operation of the adjustable latch.

Duplex spindles have hitherto been constructed with the dead spindle extending to the top, or nearly to the top of the live spindle within it. This has rendered it necessary to make the dead spindle so large in order to support the upper bearing of the live spindle steadily, that the lower bearing of the live spindle, which must necessarily be on the circumference of the lower part of the dead spindle, was also very large, causing great friction and loss of power in running at high speed. The live spindle had also to be constructed correspondingly larger and heavier to possess the requisite strength. Great difficulty has also been experienced in keeping the upper bearing of the live spindle properly lubricated from its inaccessible position within the top of the spindle when adjusted. To obviate these difficulties I construct the dead spindle B, which is driven firmly into the bolster of the lower oil-reservoir, of but about one-half the usual length, so that it will carry the upper bearing of the live spindle about the middle of the latter. Being short it can be made much smaller and carry the upper bearing steadily, while the lower bearing is reduced in size. P is a section of the rail of a spinning-frame, in which the bolster and lower oil-reservoir are secured by a nut or set-screw. The live spindle D E is constructed of the hollow part D, covering and running outside of the dead spindle and the solid part E resting in the top of and above the latter. These parts are secured firmly together with their axes in a right line. On the bottom end of the hollow part D, which is constructed thin and light, the ring *e* is driven, which is thicker than the hollow part D and has formed on its interior circumference the lower bearing of the spindle. This bearing should be below the level of the oil in the lower oil-chamber. On its exterior circumference the ring *e* is turned to correspond with the hole through the plate *i*. When the ring is revolving with the spindle this

form and relation of itself and the plate *i* keep the oil from being thrown out of the lower chamber by the rotation of the spindle. The ring *e* and plate *i* should not touch each other, a small space being left between them. The plate *i* is secured in the sides of the oil-reservoir in a horizontal plane a short distance above the bottom of the oil-reservoir, and holes *n n* are made through it to allow the oil to circulate above and below it. M is a passage-way made through the shoulder of the live spindle, between its parts D and E, to allow the oil to be supplied to the upper bearing, when necessary, and oil-chamber in the dead spindle. *h* is the whorl by means of which the live spindle is driven in the usual manner. On the lower end of the part E of the live spindle is formed the upper bearing, resting in the step *a*. This bearing is made tapering upward from its lower end, and the step *a* and itself fitted to each other. The step is made of any suitable metal, and driven into a chamber in the top of the dead spindle. Passage-ways *o o* extend from the bottom point at which the bearing rests in the step and through the step on each side of the bearing perpendicularly to the oil-chamber *d* beneath it, and within the dead spindle. This combination of the upper bearing thus formed with the step *a*, oil passage-ways *o o*, and oil-chamber *d* forms an automatic lubricating device, by which the revolution of the spindle will draw the oil up from the chamber through the central passage-way *o* upon the bearing, and any surplus oil brought to the top of the step will flow down to the chamber again through the outer passage-ways *o o*. The spindle may thus be run a month at a time without reoiling the upper bearing. S is an adjustable latch, supported at one end by and pivoted upon the standard *f* secured to the side of the lower oil-reservoir, so that it can swing in a horizontal plane. The other end of the latch is passed through a horizontal slot in the plate *g*, which is secured upon the other side of the reservoir. As the latch S is circular in form, when it is drawn back the live spindle may be removed from the dead spindle in the usual manner; but when the latch is pushed forward to the other extremity of the slot it passes just above the whorl and prevents the live spindle being raised from its position when the bobbin is being removed from it.

In addition to the advantages before enumerated of placing the upper bearing of the live spindle D E within it, about midway between its upper end and the rail P, and causing it to rest in the top of the dead spindle B, I have found that the drag or draft of the thread or yarn, while being spun upon the live spindle at either its upper or lower end, drawing the spindle to one side, and causing it to run unsteadily on ordinary spindles, is, by the described arrangement of the upper bearing, resisted and overcome by the rotary motion of the opposite end of the live spindle acting against the upper bearing as a fulcrum, and the spindle runs steadily.

The live spindle D E is designed and fitted to pass nearly through the bobbin which carries and spins the thread, and the upper bearing of the spindle is, therefore, by this arrangement, brought near the center of the bobbin longitudinally, the top of the latter being but about one-eighth of an inch above the top of the spindle. Should the bobbin be made to come higher above the top of the spindle the upper bearing of the latter should be proportionally changed upward, my object being to keep this bearing near the longitudinal center of the bobbin which carries the weight of thread upon the spindle.

What I claim as new and my invention is—

1. The compound spindle, composed of the parts B D E, constructed and combined substantially as described.

2. The upper bearing of the live spindle D E, in combination with the step *a*, passage-ways *o o*, and oil-chamber *d*, placed in the top of the dead-spindle B, substantially as described.

3. The removable ring or bearing *e*, combined with the lower end of the live spindle D E, and forming its lower bearing, substantially as described.

4. The removable bearing-step *a*, combined with the top of the dead spindle B, and forming the support or socket of the upper spindle-bearing, substantially as described.

5. The live spindle D E, having its upper bearing, which rests at the top of the dead spindle B, placed within it at or near a point equidistant from its upper and lower ends, substantially as described.

6. The horizontal plate *i*, provided with a central hole, in which the spindle revolves, and having other outside holes *n n*, placed within and above the bottom of the lower oil-chamber, and in relation to and in combination with the lower end of the live spindle D E, substantially as and for the purposes described.

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