

D. H. RICE.

Improvement in Spindles for Spinning-Machines.

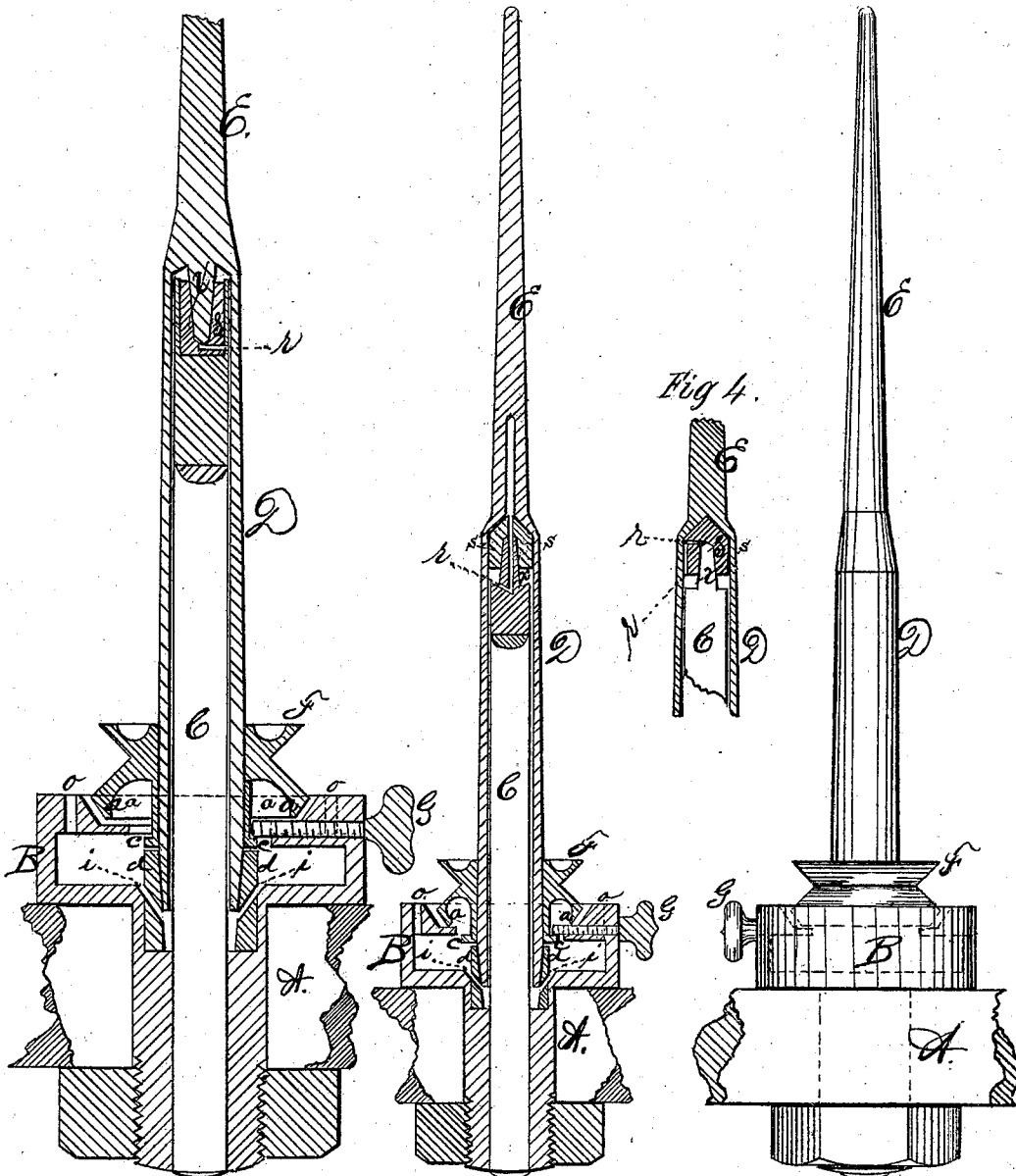
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Fig 3

Fig 2

Fig 1.



Witnesses.
J. T. Haskell
S. J. Romell.

Inventor.
David H. Rice

UNITED STATES PATENT OFFICE.

DAVID HALL RICE, OF LOWELL, MASSACHUSETTS.

IMPROVEMENT IN SPINDLES FOR SPINNING-MACHINES.

Specification forming part of Letters Patent No. **133,254**, dated November 19, 1872.

To all whom it may concern:

Be it known that I, DAVID HALL RICE, of Lowell, in the county of Middlesex and State of Massachusetts, have invented certain Improvements in Spindles for Spinning-Machines, of which the following is a specification:

The first part of my invention relates to the combination of a projection upon the whirl of a live spindle, with the cover of the lower oil-reservoir tapered to fit each other, so that a constant current of air is created by the revolution of the whirl from the reservoir; and floating fibers of cotton and dust are blown away from the reservoir and do not enter it. The second part of my invention relates to a removable collar secured in the bottom of the oil-reservoir, and serving for a bearing to the live spindle at its lower end on its exterior circumference. The third part of my invention relates to the forming of a passage-way in the upper part of the dead spindle to conduct the oil from its exterior to the extreme point of the pin on which the live spindle revolves, and secure the perfect lubrication of every part of the latter; and relates also to the combination of the live spindle and dead spindle in such a manner that while the interior surface of the former revolves sufficiently near the latter to carry up oil from the lower reservoir for lubricating the upper bearing of the latter, yet they do not touch each other between the bearings of the live spindle, thereby obviating the friction created by the contact of the live and dead spindles throughout their length, when made as heretofore.

Figure 1 is an elevation of my spindle and lower oil-reservoir. Fig. 2 is a section of the same in a vertical plane. Fig. 3 is a vertical section of a modification of the same, showing the upper bearing in a reverse position. Fig. 4 is a section of the upper bearing and bushing in the same plane, showing another modification of Fig. 2.

A is a section of the rail of a spinning-frame, into which the lower oil-reservoir B is firmly secured by a nut or set-screw. From the reservoir projects upward, perpendicularly, a dead spindle, C. On the dead spindle is placed the live spindle D E, as shown. F is the whirl, having on its lower edge an annular projection, *a*, tapering downward and inward from the periphery of the whirl. This

projection extends below the upper surface of the cover of the oil-reservoir B, and in the cover is formed a hole, in which the projection *a* revolves, made somewhat larger than the projection, and tapered on its edge to correspond with the taper of the projection. The projection *a*, revolving with the live spindle, creates a constant current of air outward from the oil-reservoir, repelling any floating fibers of cotton which would otherwise fly into the oil-chamber, and which have hitherto proved a great annoyance. Small holes *o o* are made in the cover of the oil-reservoir to admit air to it. G is a screw engaging with a thread in a lateral hole through the cover of the oil-reservoir, and the point of which, when the screw is turned up, passes above the collar *c*, which is secured to the live spindle. When turned up, the screw G thus prevents the live spindle from being lifted off the dead spindle; but when turned back the point of the screw is withdrawn and the live spindle may be removed. *d* is a removable tube or collar driven into the lower part of the oil-reservoir, and serving as a bearing in which the lower end of the live spindle revolves. Through this collar holes *i i* admit the oil to the bearings. When worn, this collar may be removed at a trifling expense and a new one substituted. The collar *d*, being secured to the oil-reservoir B independent of the dead spindle C, holds or carries the live spindle D E, free from and independent of the dead spindle, from the upper end of the latter to the lower end of the live spindle. In this respect it differs from former dead and live spindles, the lower end of the live spindle having been supported on or borne against the dead spindle heretofore. There is always a vibration or jar of the other parts of the machinery, transmitted by the band which drives the live spindle, and when the live spindle is supported at its lower end, near the whirl, against the dead spindle, this vibration or jar is communicated to the dead spindle at that point. The lower part of the dead spindle being secured firmly in the bolster or rail of the frame, this jar or vibration acts toward its upper end, where it is more intense in proportion to the length of the dead spindle above the rail, and consequently causes the upper bearing of the live spindle, at the end of the dead spindle, to vibrate, and affects the steadiness

of rotation of the live spindle. By the described method of supporting the live spindle by its lower bearing or bolster *d*, which is very near the whirl *F*, independently of and free from the dead spindle, the vibration from the band on the whirl *F* is principally exhausted against the lower bearing *d*, and none of it is communicated to the dead spindle *C* near the whirl, and very little at the upper spindle-bearing, and the live spindle runs much more steadily than with its lower bearing or end supported or bearing against the dead spindle. The live spindle *D E* is made to revolve so closely to the surface of the dead spindle *C* that the oil is carried up by its revolution to the heel or bottom part of the pin or bearing *x*, on which the weight of the spindle rests, and which forms its upper bearing; but, owing to the tapering form of the pin *x*, when the spindle is revolving no oil will enter at that end of the pin between it and its bushing attached to the other spindle, being repelled by the centrifugal force. It is therefore necessary to provide some other means of conducting the oil to the extreme point of the pin *x*, when the centrifugal force will carry it along the pin and the latter be fully lubricated. *S* is the bushing, which revolves upon the pin *x*, or in which the pin revolves, and I make a hole or passage-way, *r*, through the side of the dead spindle *C*, leading to the point in the bushing where the extreme tip of the pin *x* rests. In Fig. 3 the pin is secured in the live spindle, and projects downward into the bushing, and the passage-way *r* conducts the oil through the dead spindle and bushing to its extreme point. In Fig. 2 the pin is made upon the dead spindle, and the bushing is placed in the live one, and the passage-way *r*, entering the dead spindle as before, is carried up through the center of the pin *x* to its extreme point. In Fig. 4 the passage-way *r* passes through the bushing in the live spindle to the extreme point of the pin *x*. As the several parts perform the same functions in each case, I regard these modifications as equivalents.

As the oil is brought up between the dead and live spindles by the rotation of the latter it enters the passage-way *r* and rises to the end of the pin *x*, and at all times perfectly lubricates the latter.

While the live spindle revolves with its internal surface sufficiently near to the dead spindle to carry up oil from the lower reservoir to lubricate the upper bearing, as before described, yet the live spindle is prevented, by its bearings, from touching the dead spindle at any point between the bearings. In this the live and dead spindles are combined differently from those of other duplex spindles, which have been heretofore made to touch or revolve against each other substantially throughout their entire length when intend-

ed to carry the oil from the lower oil-cup to the upper bearing or end; and when intended to have their upper and lower bearings oiled independently of each other the live and dead spindles have been placed so far apart as not to carry up oil between them from their lower to their upper ends. In the former case the contact of the live and dead spindles throughout the whole or a large part of their length created a great amount of friction, and also, in the course of a few months' use, wore off one side of the dead spindle, so that they ceased to carry up the oil as effectively as at first; while in the latter case, the upper and lower bearings being independent, great difficulty and expense of lubricating the upper bearing from its inaccessible position ensued. By my method of combining the dead and live spindles, I obviate all these difficulties, preventing friction and wear of the dead and live spindles, and keeping my upper bearing automatically lubricated at all times from the lower oil-reservoir.

I have found that a uniform distance of from the one to two hundredth part of an inch between the internal surface of the live and the dead spindles operates effectively to raise the oil from the lower reservoir to the upper bearing, and prevent the live and dead spindles coming in contact between the bearings; but the spindles *D E* and *C* may be placed at any other distance which will prevent their coming in contact between the bearings, and elevate the oil to the upper bearing, as I have described.

What I claim as new and my invention is—

1. The combination of the tapering part *a* of the whirl with the perforated cover of the oil-reservoir *B* in which it rotates, constructed, as described, so as by the revolution of the former to create a current of air and repel floating substances from the oil-reservoir, substantially as described.

2. The collar *d* secured to the oil-reservoir, and combined with and forming a lower bushing or bearing for the live spindle *D E*, substantially as described.

3. The dead spindle *C* or bushing *S*, provided with the passage-way *r* for conducting oil from its exterior to the extreme point of the upper bearing of the live spindle, substantially as described.

4. The combination of the live spindle *D E* with the dead spindle *C* by means of its lower and upper bearings, so that the spindles shall not come in contact with each other between the bearings, and yet be near enough to each other to carry up oil between them from the reservoir *B* to the upper bearing, substantially as described.

Witnesses: DAVID HALL RICE.

J. T. HASKELL,

WALTER R. YORK.