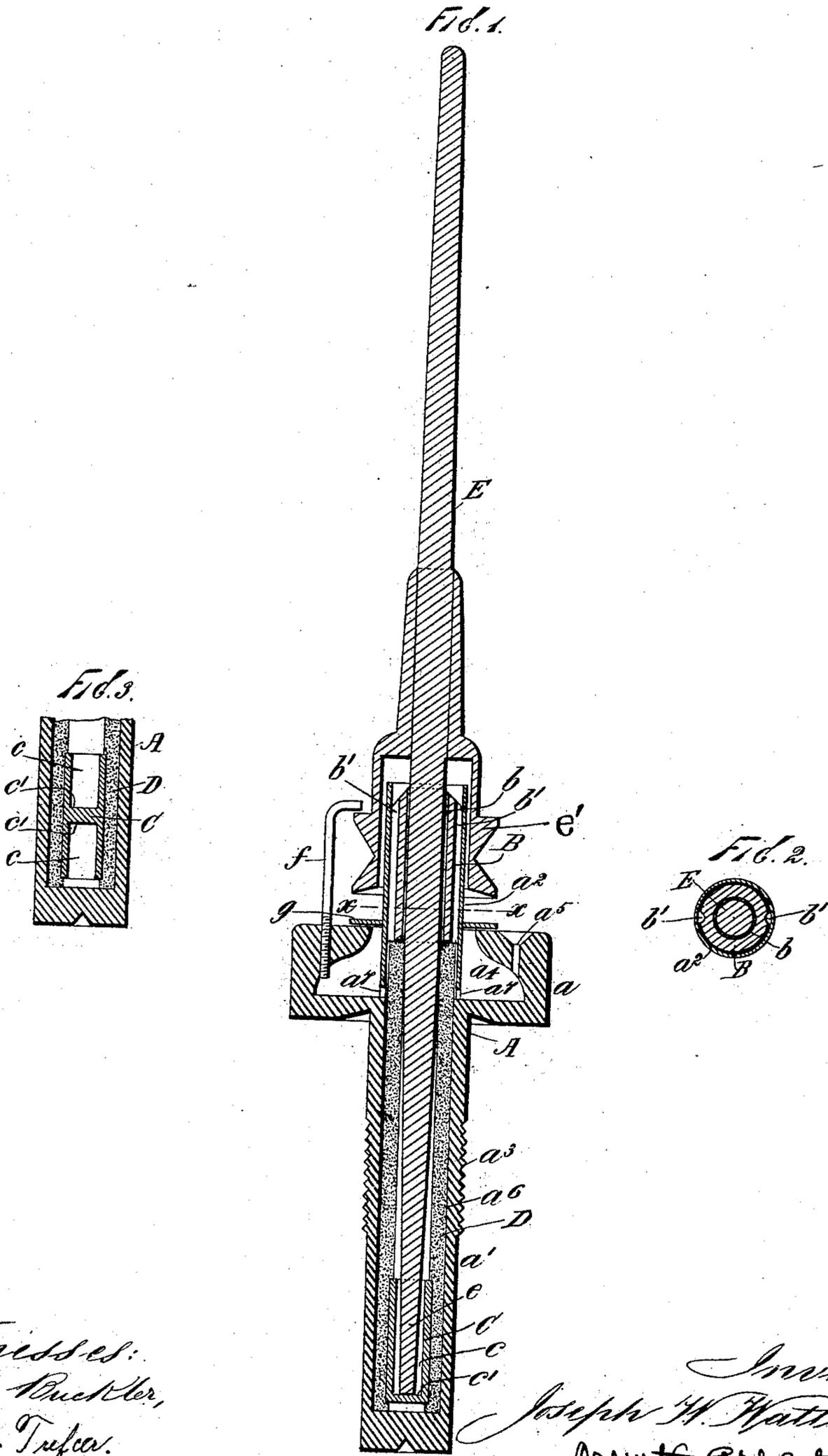


(No Model.)

J. W. WATTLES.
SPINDLE AND BEARING THEREFOR.

No. 509,982.

Patented Dec. 5, 1893.



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UNITED STATES PATENT OFFICE.

JOSEPH WARREN WATTLES, OF CANTON, MASSACHUSETTS.

SPINDLE AND BEARING THEREFOR.

SPECIFICATION forming part of Letters Patent No. 509,982, dated December 5, 1893.

Application filed July 5, 1893. Serial No. 479,575. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH WARREN WATTLES, a citizen of the United States, and a resident of Canton, county of Norfolk, and State of Massachusetts, have invented certain new and useful Improvements in Spindles and in the Bearings Therefor, of which the following is a specification.

My invention relates more especially to that class of spindles and bearings in which the spindle is capable of yielding laterally under the influence of an unbalanced load; and has for its object to provide a spindle of this class and bearings therefor, which, while exceedingly cheap and simple in construction shall, at the same time, be more efficient in operation than those heretofore in use.

To these ends, the invention consists first, in certain improvements in the mounting of the step bearing of the spindle whereby it is cushioned both laterally and vertically by the same yielding and elastic sleeve in which it is mounted; second, in the combination of a bolster bearing, and spindle, with a step bearing thus mounted, and third, in certain other minor constructions and combinations of parts, all as will hereinafter more fully appear.

Referring to the accompanying drawings which form a part of this specification, Figure 1, is a sectional elevation of a spindle, its bearings and the bolster holder, taken axially of such parts; Fig. 2, a transverse section of these parts taken in the plane xx of Fig. 1, and Fig. 3, a sectional detail of portions of the lower ends of the bolster holder, the spindle, the yielding sleeve, and a step bearing of a slightly modified construction.

In all the figures, like letters of reference are employed to designate corresponding parts.

A indicates the bolster holder by means of which the spindle and its bearings are secured to the spindle rail or other support. This bolster holder may be constructed in various ways. In the exemplification of the invention illustrated in the drawings however, it consists of a body portion, a , a depending shank, a' , and an upwardly projecting portion, a^2 , the depending shank of which is provided in its exterior with a screw thread, a^3 , for the reception of a nut (not shown) where-

by to clamp the holder to the rail or other support.

Formed in the body portion a , around the cylindrical upwardly projecting portion a^2 , is a reservoir, a^4 , for reception of oil or other lubricant which may be conveniently supplied thereto through the duct a^5 , while extending axially of the upwardly projecting portions a^2 and of the depending shank a' , is a cylindrical chamber, a^6 . This chamber is preferably closed at its bottom to prevent the escape of any oil or lubricant that may flow into the same, and connects at or near its upper end with the reservoir a^4 , through the intermediary of the ducts a^7 .

Located in the upper end of the cylindrical chamber a^6 , preferably though not necessarily so as to be incapable of any lateral movements therein, is the bolster bearing B, which is provided with the usual axial orifice b for reception of the spindle. This bolster bearing may be made of any of the usual and well known materials that are ordinarily employed in the construction of such parts; but, in the example of the invention shown in the drawings, it is preferably made of brass with its upper end, which is slightly lower than the upper end of the upwardly projecting portion a^2 , inclined downwardly from the central opening b to its periphery, where it communicates with the ducts b' , which, formed in the periphery of the bearing, extend longitudinally of the same from its top to its bottom, and permit of the oil or other lubricant carried up by the spindle when in rotation returning to the chamber a^6 .

C indicates the step bearing for the spindle, which, preferably separate from, and independent of, the bolster holder is made in cylindrical or other approved contour on its exterior, and is provided with a socket, c , for reception of the foot of the spindle. This socket c is preferably though not necessarily made as a cylindrical chamber extending axially of the bearing, with the bottom c' thereof, which is closed, made flat or in a plane lying at right angles to the axis of such chamber, as shown. In the construction of this step bearing, any of the usual and well known materials ordinarily made use of in constructing such part may be employed, and the socket

c may be made either in one end thereof, as shown, for instance, in Fig. 1, or in both ends of the same, as illustrated in Fig. 3, in which last mentioned case however the bearing, when the socket becomes worn, may be reversed and the socket in the other end thereof brought into use. As thus constructed, the step bearing *C* is arranged within the lower end of the felt or other yielding and elastic sleeve, *D*, which, being made of an exterior diameter to closely fit the interior of the chamber *a*⁶, extends from the bottom of such chamber to the lower end of the bolster bearing *B*, between which and the bottom of the chamber it is closely confined and prevented from rotation. The interior of this sleeve, on the other hand, is preferably made somewhat smaller than the exterior of the step bearing *C*, in order to make the same grip the latter by its resilient properties, and, as it extends some distance below such bearing, it serves not only as a means for cushioning it laterally but also vertically.

Arranged within the bolster bearing *B* and the step bearing *C*, is the spindle *E*. This spindle may be made in any of the well known forms heretofore in use, or of any other construction desired, but as here shown it is of the sleeve whirl type with its lower portion tapering gradually from a point opposite the lower end of the bolster bearing, to its foot or lower end *e*, which latter, where it enters the step bearing *C*, is somewhat smaller than the interior of the socket *c* therein, and has its extremity which rests upon the bottom *c'* of such sockets made as a flat plane or as the segment of a sphere. By thus making the portion of the spindle which enters the step bearing of smaller diameter than the interior of the socket in such bearing, with the lower extremity of the spindle and the bottom of the socket made as planes, or the one as a segment of a sphere, and the other as a plane, the lower end of the spindle is free to move within such socket to a limited extent, as the spindle is caused to move laterally or gyrate under the influences of an unbalanced load, without necessitating the movement of the step bearing in the bolster holder. When however the movement or gyration of the spindle is such as to necessitate a greater amount of lateral movements than what is permitted to the foot of the spindle in the socket *c*, then, when the foot or lower end *e* of the spindle has been brought into contact with the interior walls of the socket, the step bearing itself will yield laterally against the yielding sleeve *D*, and the necessary amount of lateral movement required by the foot or lower end of the spindle allowed thereto.

To permit of the necessary lateral gyratory movement being given to the spindle when required, the bolster bearing, when fitted closely to the bolster holder, will have its central orifice *b* made somewhat larger than the spindle *E*, whereby to impart to the latter a

looser fit therein than what is usual in spindles of this class. On the other hand, when the bolster is made with a loose fit in the bolster holder, the fit of the spindle in the orifice *b* will be made as close as is possible and allow of the free rotation of the spindle therein. The spindle and bearing being thus constructed and arranged to yield laterally in all directions under the exigencies of an unbalanced load, the location of the whirl *e'* becomes a matter of importance, and, in my preferred construction, I so locate it with respect to the bolster bearing *B* that the plane of the band pull passes through such bearing at a point midway its length, whereby to bring such pull as near the center of oscillation or gyration as is possible. By thus locating the whirl in this position, the pull of the driving band is applied in a plane which offers the least resistance to the free oscillating or gyrating movement of the spindle as the same is moved out of its normal position by the action of the load.

To prevent the withdrawal of the spindle from its bearings, by the removal of the bobbin or otherwise, I make use of the usual hook or turn button *f*, which, screwed into the body portion *a* of the bolster holder, engages with its upper overturned end the upper side of the whirl *e'*, as shown. Similarly to prevent the ingress of cotton or dirt to the reservoir *a*⁴, I find it convenient to cover the same by an annular plate *g*, which, encircling the upwardly projecting portion *a*² of the bolster holder *A*, rests upon the body portion *a* of such holder, and affords an efficient means for excluding all foreign substances from such reservoir.

By the above mentioned construction, I provide a spindle and the bearings therefor which not only permit of the spindle yielding laterally in all directions under the influences of an unbalanced load, but which likewise permits of the spindle being run at the highest rate of speed without heating or objectional jarring.

Although in the foregoing I have described the best means contemplated by me for carrying my invention into practice, I wish it distinctly understood that I do not limit myself strictly thereto, as it is obvious that I may modify the same in various ways without departing from the spirit thereof, as, for instance, instead of making the lower portion of the spindle tapering from a point opposite the lower end of the bolster to its lower end, it may be made of a uniform diameter and the portion which enters the socket *c* alone reduced in size.

Having thus described my invention and shown certain of the ways in which it is or may be carried into effect, what I claim as new, and desire to secure by Letters Patent of the United States, is—

1. The combination, with a bolster holder, and an independent step bearing constructed

with a chamber or socket having its bottom made flat or lying in a plane at right angles to its axis, of a spindle made smaller at its lower end than the interior of such socket, and a yielding and elastic sleeve closely fitting the interior of the bolster holder and receiving within its interior, above its lower end, the step bearing, whereby such step bearing is cushioned both laterally and vertically in said holder, substantially as described.

2. The combination, with a bolster holder, a bolster mounted therein, and an independent step bearing constructed with a chamber or socket having its bottom made flat or lying in a plane at right angles to its axis, of a spindle made smaller at its lower end than the interior of such chamber or socket, with its end that rests upon the bottom of said chamber or socket made flat, of a yielding and elastic sleeve closely fitting the interior of the bolster holder and receiving within its interior, above its lower end, the step bearing, whereby such step bearing is cushioned both laterally and vertically within the said holder, substantially as described.

3. The combination, with a bolster holder, a bolster mounted therein, and an independ-

ent step bearing constructed with a chamber or socket for the reception of the lower end of the spindle in each of its ends, with the bottom thereof made flat or lying in a plane at right angles to its axis, of a spindle made smaller at its lower end than the interior of such chamber or socket, and a yielding and elastic sleeve closely fitting the interior of the bolster holder and receiving in its interior, above its lower end, the step bearing, whereby to cushion the same both laterally and vertically, substantially as described.

4. The combination, with a bolster holder, a bolster mounted therein, and an independent step bearing, of a spindle supported by such step bearing, and a yielding and elastic sleeve closely fitting the interior of the bolster holder, for reception of the step bearing within its interior near its lower end, and confined in the bolster holder between the bottom thereof and the lower end of the bolster, substantially as described.

In testimony whereof I have hereunto set my hand this 29th day of June, 1893.

JOSEPH WARREN WATTLES.

Witnesses:

N. W. DUNBAR,
WALTER AMES.