No. 659,874. Patented Oct. 16, 1900.

F. J. RABBETH.

CUSHIONED BEARING.

(Application filed Nov. 9, 1898.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 1.

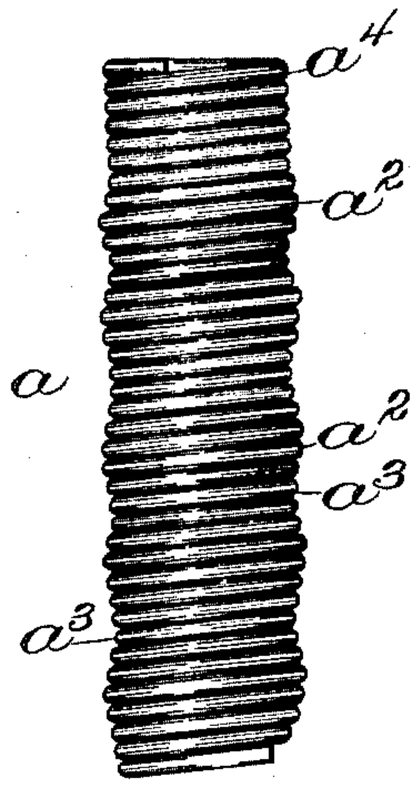

Fig. 2.

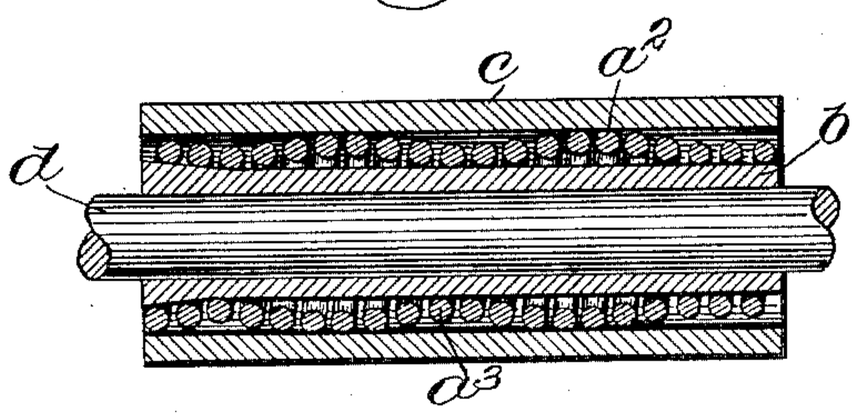

Fig. 3.

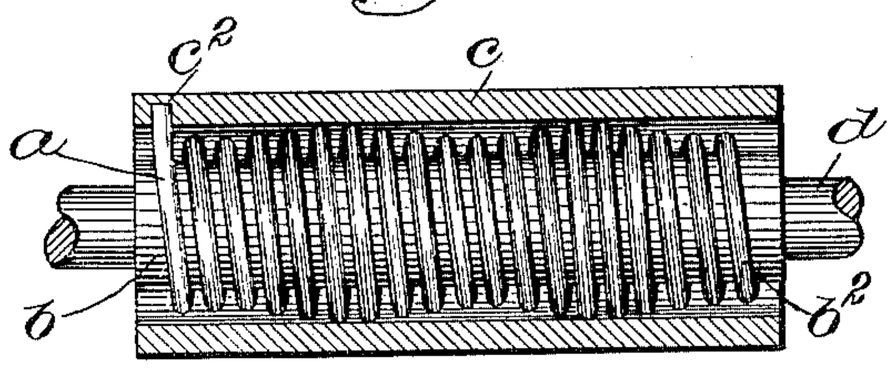

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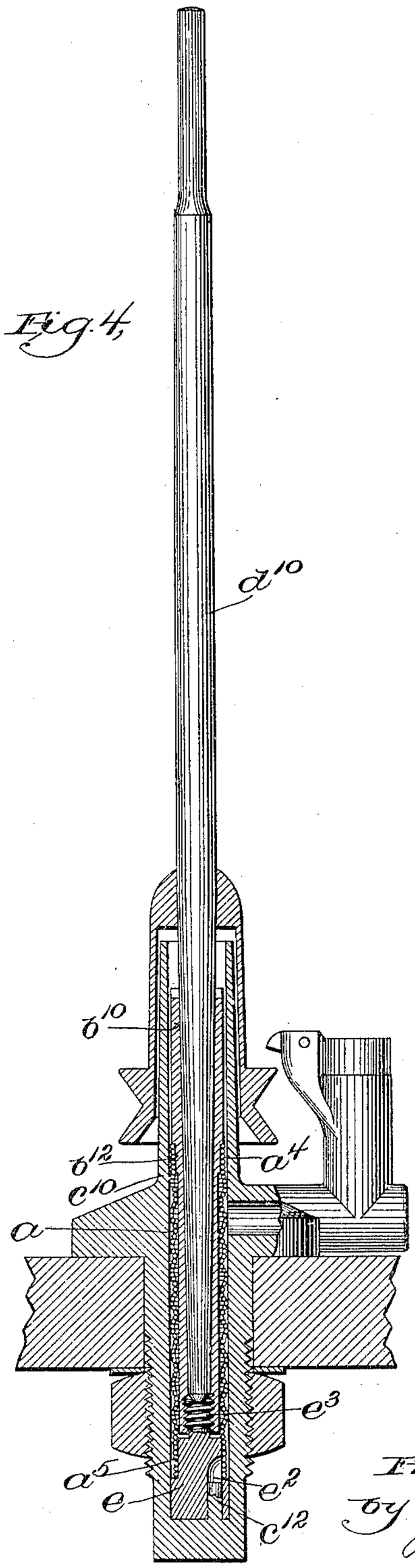
Fig. 4.



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UNITED STATES PATENT OFFICE.

FRANCIS J. RABBETH, OF BOSTON, MASSACHUSETTS.

CUSHIONED BEARING.

SPECIFICATION forming part of Letters Patent No. 659,874, dated October 16, 1900.

Application filed November 9, 1898. Serial No. 695,968. (No model.)

To all whom it may concern:

Be it known that I, FRANCIS J. RABBETH, of Boston, county of Suffolk, and State of Massachusetts, have invented an Improvement in Cushioned Bearings, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

The present invention relates to a high-speed bearing—such as those used for spindles, emery-wheels, and the like—where the bearing proper is supported in a casing and cushioned with relation thereto to prevent vibration and to insure smooth and easy running, the cushion employed being of novel construction and entering into novel combinations with the other elements of the bearing. The cushion aforesaid, which in itself forms a feature of the invention, comprises a spiral spring having convolutions of maximum diameter and convolutions of minimum diameter between which may be and preferably are one or more intermediate convolutions the diameter of which is less than the maximum and greater than the minimum, so that the outer surface of the spring as a whole is corrugated, it being practicable to form such a spring by winding the spring-wire upon a corrugated arbor. The said spring is interposed between the bearing and its support, the coils of largest diameter engaging snugly with the inner walls of the support and the coils of smallest diameter engaging with the outer walls of the bearing, so that the latter is centered and snugly held with relation to the former, while that part of the spring which connects the coils aforesaid is not in contact with either member and affords an elastic cushion. By making the coils of largest diameter somewhat larger than the inside diameter of the bearing-support and the coils of smallest diameter somewhat smaller than the outside diameter of the bearing the two parts may be held together, so as to substantially prevent the rotation of the bearing itself with relation to its support, without affecting the elasticity of the cushion, and in some instances the ends of the spring may be positively connected with said bearing and support, respectively, to thereby lock the said parts one with relation to the other.

The invention further relates to certain novel details of construction and arrangement of the bearing and cushion as applied to a spindle, in which the cushion enters into combination with the bolster, bolster-support, and step, as will be hereinafter more fully described.

Figure 1 is an elevation of a cushion embodying the invention. Fig. 2 is a longitudinal section of a bearing and bearing-support having the said cushion applied thereto. Fig. 3 is a similar section showing a modification, and Fig. 4 is a vertical section of a spindle having the bearing embodying the invention applied thereto.

The cushion a comprises a spiral spring which may be formed in any suitable or usual way, preferably by winding wire upon a corrugated or otherwise suitably-shaped arbor, the said spring, as shown, having a number of convolutions a^2 of maximum diameter and a number of convolutions a^3 of minimum diameter and intermediate convolutions of a diameter less than the maximum and greater than the minimum and herein shown as progressively decreasing in diameter from the convolutions a^2 to the convolutions a^3 and then increasing from the latter to the former, so that the longitudinal outline of the spring forms a series of curves or corrugations.

The bearing as a whole comprises a bearing-sleeve b, adapted to afford the direct bearing-support for the rotary member d, the said sleeve being centered in a supporting member c by means of the cushion a, which is interposed between the inner surface of the supporting member and the outer surface of the bearing-sleeve. The bearing member b corresponds to what is known as the "bolster" of a spindle, and the support c corresponds to the bolster-support, and the parts are so shown in Fig. 4, it being obvious, however, that the cushion a is applicable not only to bearings for spindles, but also to any high-speed bearings where a slight variation in position between the mechanical center and the balanced center of the rotary member has a tendency to set up objectionable vibrations.

As shown in Fig. 2, the coils of smallest diameter fit snugly upon the outer surface of the member b, and the coils of largest diameter fit snugly upon the inner surface of the

supporting member *c*, while the intermediate coils are out of contact with either member, and consequently retain all their freedom of movement and elasticity. It is obvious, moreover, that the spring-cushion may be arranged to fit snugly between the two parts, so that the coils which are respectively in contact therewith will have a strong frictional hold thereon, thus preventing the rotation of the bearing member with relation to its support. This tendency may be increased by so arranging the spring that the tendency of the bearing to rotate will have a corresponding tendency to unwind the spring, thus spreading the coils and increasing the frictional bearing thereof on the support. The intermediate coils will in any event be out of contact with both parts, so that the cushion will have free play.

As shown in Fig. 3, the ends of the spring may be arranged to positively engage the bearing and bearing-support, respectively, the ends of said spring being bent or offset and entering openings b^2 and c^2 in the bearing and supporting member, respectively, the opening b^2 being indicated in dotted lines.

In Fig. 4 the bearing is shown as applied to a spindle, the spindle d^{10} corresponding to the rotating member *d* shown in the other figures. The bearing portion or "blade" of said spindle is tapered as indicated and fits in the bolster b^{10}, which corresponds to the part *b* hereinbefore described, the said bolster in turn being inclosed and supported in the bolster-support c^{10}.

The cushion *a* is interposed between the bolster and the bolster-support, the former having a loose fit in the latter, so as to allow the play necessary to permit the spindle to find its balanced center upon the step or support *e* upon which it spins. The said cushion *a* in this instance, as in the construction heretofore described, yieldingly centers the bolster in the bolster-support and properly cushions the bearing. The cushion in this instance is shown as frictionally engaging the bolster at one end, so as to prevent the rotation thereof with the spindle, the said cushion having a portion of its coils of substantially uniform diameter, as indicated at a^4, the said coils being adapted to fit snugly upon the outer surface of the bolster b^{10}.

To facilitate the insertion of the bolster into the spring the said bolster is shown as enlarged at b^{12}, so that the enlarged portion will be frictionally engaged by the coils a^4, while the parts may be easily assembled, since the smaller portion of the bolster will pass readily through the main portion of the spring. While the opposite end of the said spring-cushion might be connected or frictionally engaged with the bolster-support c^{10} after the manner of the construction shown in Fig. 3, it is preferably also utilized to perform an additional function by frictionally fitting the portion of its coils indicated by the reference-letter a^5 upon the step *e*, which is shown as prevented from rotation by means of a projection c^{12} from the inner wall of the bolster-support c^{10}, which projection enters a slot e^2 cut in the said step.

The bolster b^{10} is connected by an internal screw-thread with an external screw-thread e^3 upon the step *e*, so that the said bolster can be raised or lowered with relation to said step by turning the same upon said screw-thread.

The spindle d^{10} and the bolster b^{10} being tapered it is obvious that the proper bearing fit can be obtained by a vertical adjustment of the bolster with relation to the step, and the said screw-thread e^3 is so arranged that by turning the bolster in the direction of rotation of the spindle the said bolster will be screwed downward along the screw-thread, so that the body of the bolster is lowered with relation to the step, thereby loosening the fit between the bolster and the spindle. If, therefore, when the spindle is started there is a frictional fit between the said spindle and the bolster, it will cause the bolster to turn until the spindle rotates freely therein, so that the bearing becomes self-adjusting. It is essential, however, that the bolster should not rotate too far and also that it should have a tendency to move to a position where the fit is approximately perfect. To this end, therefore, the spring-cushion *a* is arranged to engage at one end with the step *e*, the said spring, which is engaged at its other end with the bolster, thus resisting the tendency of the spindle to turn said bolster, so that as soon as the said bolster is turned far enough to relieve the friction developed between it and the spindle it will cease turning, thereby maintaining a substantially-perfect adjustment.

I claim—

1. A high-speed bearing comprising a bearing member to afford the direct lateral bearing-support for the rotary member; a tubular support for said bearing member; and a cushion interposed between the outer wall of said bearing member and the inner wall of said support, said cushion comprising a spiral spring having continuous coils of varying diameter, those of least diameter being in contact with said bearing and those of greatest diameter in contact with said support, substantially as described.

2. A lateral cushion for high-speed bearings which have an inner support or bearing member, and an outer support, said cushion comprising a spiral spring having a plurality of coils of one diameter and a plurality of coils of another diameter, said coils being arranged respectively to engage the outer wall of said inner support and the inner wall of said outer support, the said spring being continuous from end to end so that the parts which connect the coils aforesaid extend from one of the parts to be cushioned to the other and thereby afford the cushioning means, substantially as described.

3. A high-speed bearing comprising a bearing member to afford the direct lateral bear-

ing-support for the rotary member; a tubular support for said bearing member; and a cushion interposed between the outer wall of said bearing member and the inner wall of said support, said cushion comprising a spiral spring having coils of such diameter as to engage the bearing member, and coils of such diameter as to engage the support, the said coils being arranged so as respectively to engage said parts at a number of points, substantially as described.

4. In a high-speed bearing, the combination with a lateral bearing-support; of the lateral bearing member; and means for cushioning said bearing member in said support and preventing rotation thereof relative to said support, said means consisting of a spiral spring interposed between said support and said bearing, the said spring having coils of such diameter as to conform to and frictionally engage the outer wall of the bearing member and coils of such diameter as to conform to and frictionally engage the inner wall of the support, the said coils being arranged so as respectively to engage said parts at a number of points, substantially as described.

5. In a high-speed bearing, the combination with the bearing proper; of a tubular support therefor; a cushion interposed between said bearing and said support comprising a spiral spring having coils of such diameter as to conform to and fit the outer wall of the bearing member, and coils of such diameter as to conform to and fit the inner wall of the support, the said coils being arranged so as respectively to engage said parts at a number of points; intermediate coils to afford the cushion proper; and means for connecting one end of said spring with the bearing proper, and the other end with the tubular support, substantially as described.

6. In a spindle, the combination with the tapered spindle-blade, of the correspondingly-tapered bolster; the bolster-support; the spindle-step non-rotatably secured in said bolster-support and provided with a screw-threaded portion coöperating with a corresponding screw-thread in the bolster; a cushion-spring interposed between the outer wall of said bolster and the inner wall of said bolster-support; and an extended portion continuous with said spring, the cushioning portion of said spring frictionally engaging said bolster and the extended portion thereof frictionally engaging said step, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

FRANCIS J. RABBETH.

Witnesses:
HENRY J. LIVERMORE,
NANCY P. FORD.