(No Model.) 2 Sheets—Sheet 1.

A. R. SHERMAN.

SUPPORT FOR SPINNING AND TWISTING SPINDLES.

No. 562,668. Patented June 23, 1896.

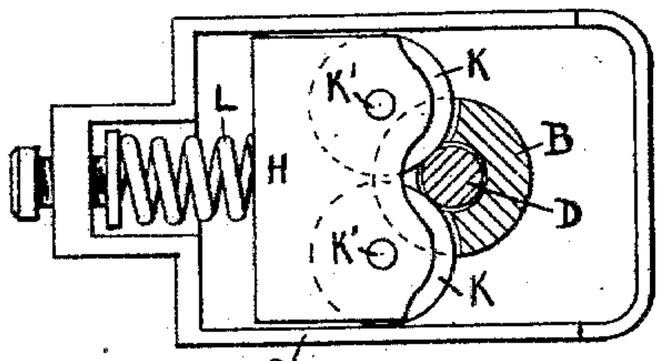

Fig. 2.

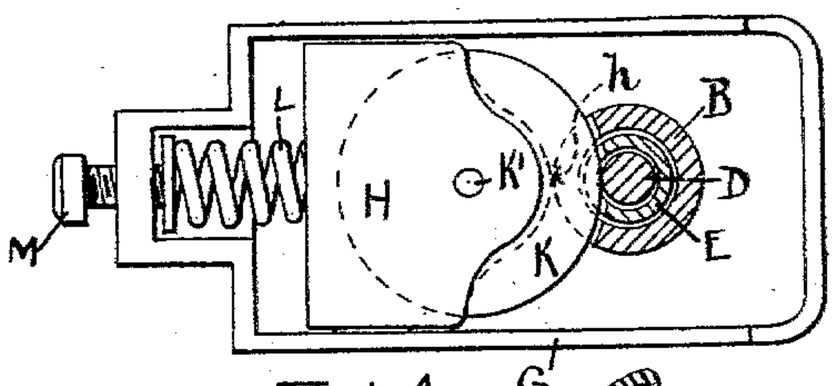

Fig. 4

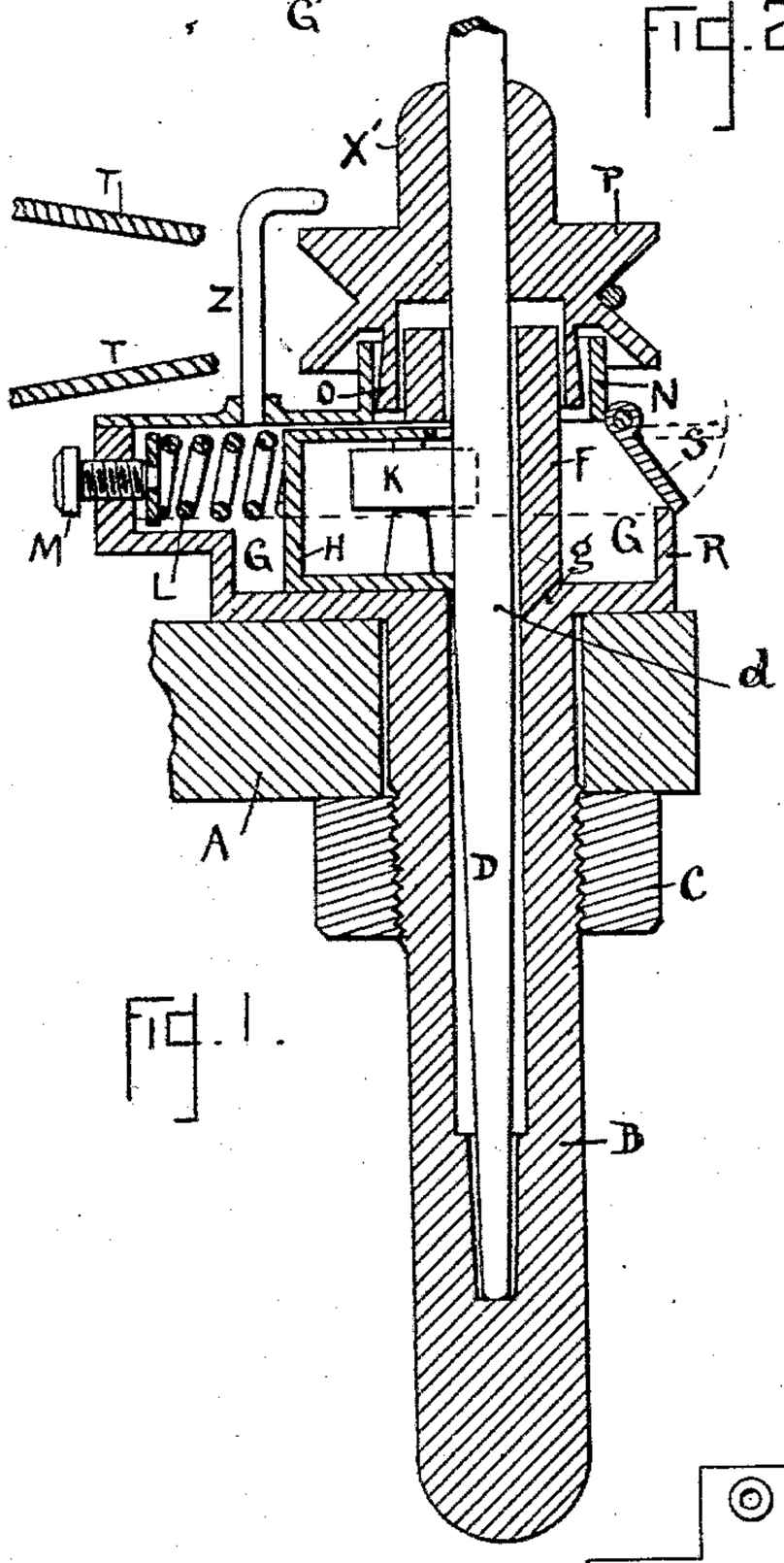

Fig. 1.

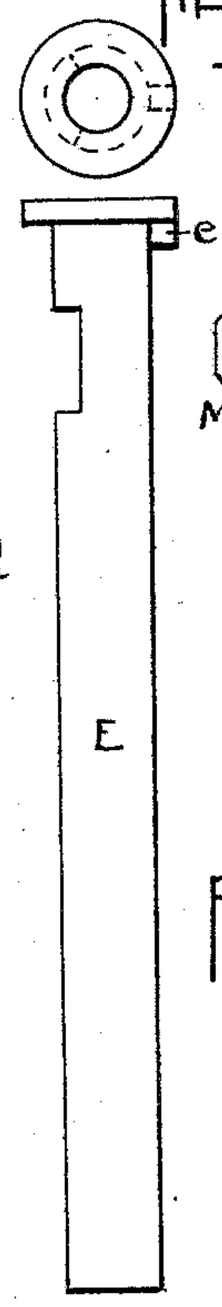

Fig. 6.

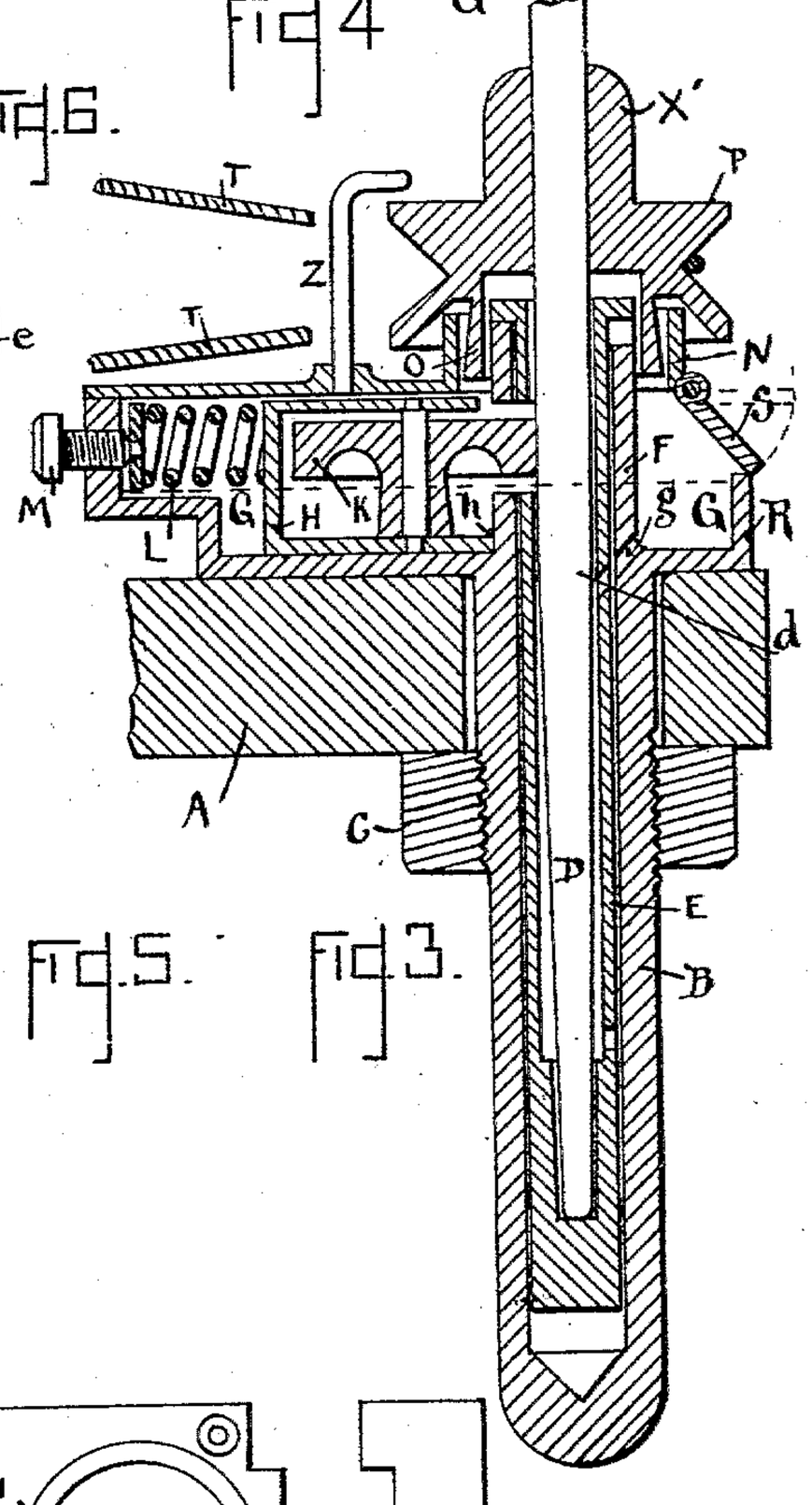

Fig. 3.

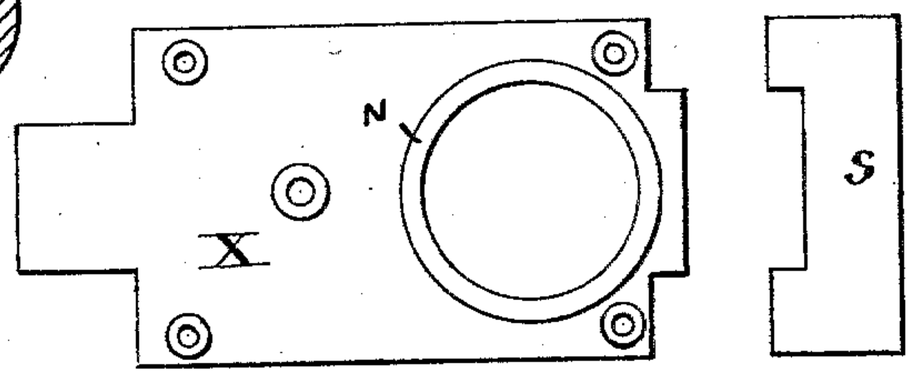

Fig. 5.

Fig. 7.

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(No Model.) 2 Sheets—Sheet 2.

A. R. SHERMAN.

SUPPORT FOR SPINNING AND TWISTING SPINDLES.

No. 562,668. Patented June 23, 1896.

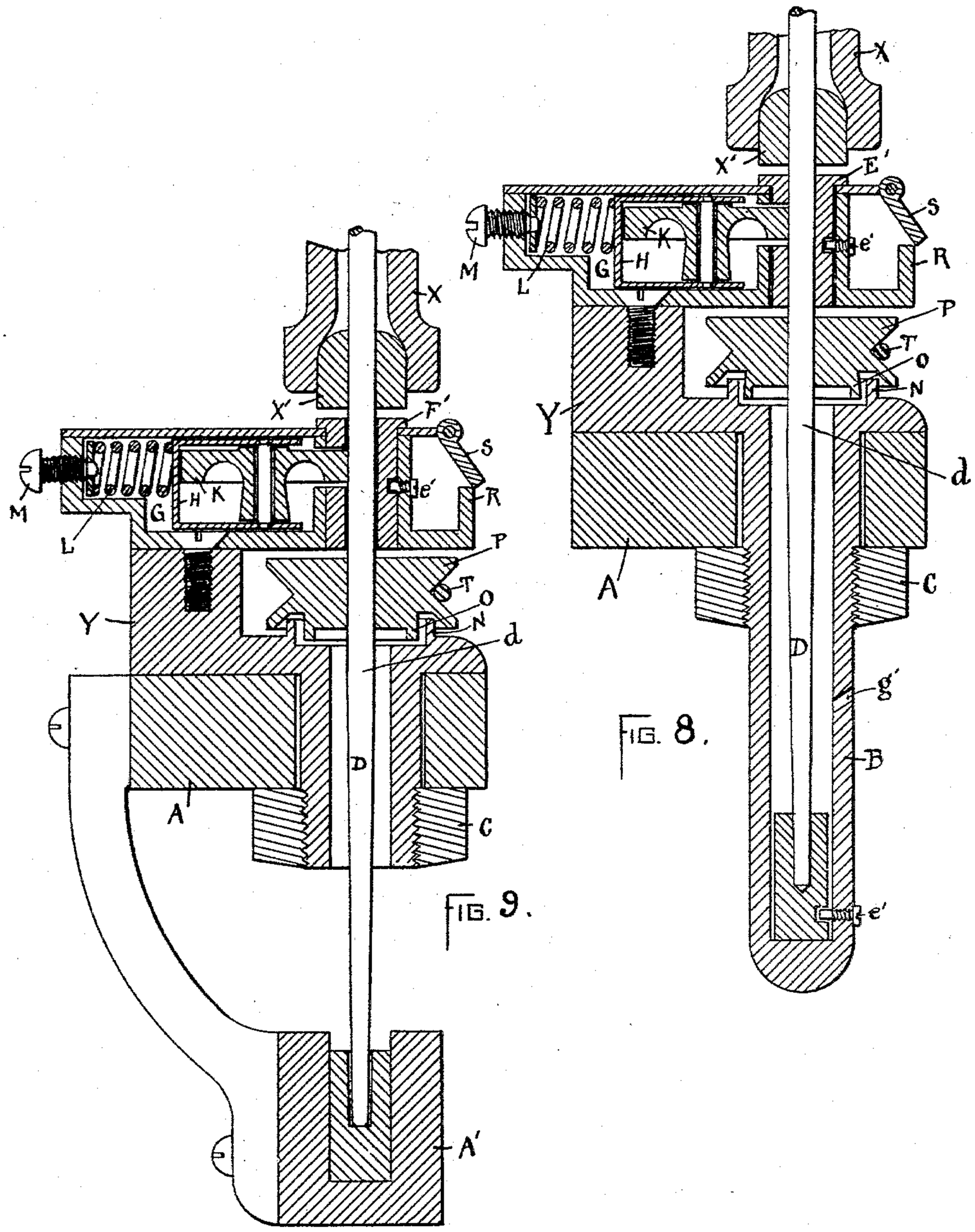

FIG. 8.

FIG. 9.

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UNITED STATES PATENT OFFICE.

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SUPPORT FOR SPINNING AND TWISTING SPINDLES.

SPECIFICATION forming part of Letters Patent No. 562,668, dated June 23, 1896.

Application filed April 25, 1896. Serial No. 589,050. (No model.)

To all whom it may concern:

Be it known that I, ALBERT R. SHERMAN, a citizen of the United States, residing in the city of Pawtucket, in the county of Providence and State of Rhode Island, have invented a new and useful Improvement in Supports for Spinning and Twisting Spindles, of which the following, with the accompanying drawings, hereby made a part of this specification, is a description.

The object of this invention is to provide an improved construction and arrangement of the mechanism supporting a spinning or twisting spindle that while enabling the spindle in running to have freedom to find its own center of rotation when unequally loaded will greatly reduce the amount of friction, and insure easy running and a high rate of speed.

The essential feature of my invention consists in the combination, with a spinning or twisting spindle supported by a step at its foot, of a bolster-bearing for the spindle consisting of an antifriction wheel or wheels mounted in a slightly-movable frame with a spring or other yielding pressure back of it. This bolster-bearing may be placed either above or below the whirl of the spindle, but should be placed on the back side of the spindle to oppose the strain of the driving-cord, since it is the driving-cord that tends to pull the spindle out of its natural center of rotation. While preserving this essential combination of my invention, the construction of the remaining portions of the mounting may be variously modified to suit varying conditions and preferences, and I have shown several such modifications in the drawings.

Thus Figures 1 and 2 show in section those forms which, I think, can ordinarily be most advantageously used, the bolster-bearing here being just below the whirl. It is at times, however, advantageous to get the whirl below the bolster-bearing, as, for instance, with mule-spinning and heavy twisting upon frames; and Figs. 8 and 9 represent, also in section, arrangements for this purpose. It is to be understood, however, that there may be still other arrangements of the parts, and that I do not necessarily confine myself to those shown. Figs. 2 and 4 are plan views, partly in section, of the constructions shown in Figs. 1 and 3, respectively; and Figs. 5, 6, and 7, views of certain details.

In the drawings, D represents the spindle, which is loosely mounted and shown with its upper portion broken off, and resting upon a suitable step at its foot. P represents the whirl attached to the spindle, and T the driving-cord; H, the frame in which are mounted the antifriction wheel or wheels K, this frame being slightly movable back and forth, and L the spring back of and pressing against the frame H, its other end resting either directly against a fixed stationary backing or against a screw mounted in such backing, as hereinafter described. These are the more essential elements of my invention.

A represents the rail of the spinning-frame upon which the spindles are mounted at intervals of a few inches. It is preferable to mount the bolster-bearing in an extension G of a casing attached rigidly to this frame, and through which the spindle passes. Such an arrangement makes a compact and convenient mounting, which can readily be manufactured separately and which particularly in some forms of it can be easily placed or mounted on the rail A of the spinning-frame. I have shown such a casing in the drawings, although it is to be understood that it does not form an absolutely essential part of my invention. This casing rests upon the upper side of the rail A, and passing through it is rigidly attached thereto by a nut C below, working on a screw-thread cut on the outer surface of the casing; and it is provided with a tube F through it for the spindle. Above the rail A the casing has a box-like extension G, within which are mounted the frame H, with its antifriction wheel or wheels K, and the spring L, one end of the spring L either resting against the back of the box or against the screw M, mounted therein. This box-like extension G preferably rests, where the construction otherwise permits it, directly upon the rail, but in some constructions where, as shown in Figs. 8 and 9, the whirl is below the bolster-bearing and above the rail the box extension is made separately from the casing and is attached to a block Y, made as a part of the casing, so as to raise it above the rail to permit the driving-cord to reach the

whirl, it being understood that this block Y is sufficiently narrow to permit the cord to pass either side of it.

The box-like extension G preferably surrounds the spindle-tube F upon all sides, as shown in Figs. 2 and 4, and may thus be made to form an oil-reservoir for lubricating the antifriction wheel or wheels, and where the construction will otherwise permit of it, as hereinafter explained, for lubricating the spindle also, and which may be readily reached by the attendant. The wheel or wheels K should be of as large a diameter as compared with the spindle as is practicable in placing them upon the rail of the spinning-frame, and they should be mounted in the frame H upon small axles or pins K′, Figs. 2 and 4, which serves to greatly reduce friction. In ordinary cases one wheel K will be preferable as permitting of a larger diameter being given to it, but there may be cases where two of smaller diameter are rendered advisable by the construction of the spinning-frame. One wheel K is shown in Figs. 3 and 4 and two in Figs. 1 and 2.

It is preferable to surround the lower end of the spindle by a tube B, closed as the bottom and forming a continuation of the tube F, and construct a step for the foot of the spindle therein. Such a tube forms a ready means of furnishing the lower portion of the spindle with oil, and where the whirl is above the bolster-bearing, as in Figs. 1 and 3, the oil may be supplied from the reservoir G, as by the oil-hole *g;* but where two rails are used, as shown at A and A′ in Fig. 9, this tube B may be omitted and the step for the spindle made in the lower rail, it being understood that in such cases the whirl is frequently located below the upper rail, although, as hereinafter pointed out, the bolster-bearing and whirl are preferably kept as near together as possible. Again where the lower tube B is employed two constructions are possible. (Shown in Figs. 1 and 3 respectively.) Thus in Fig. 1 the tube F B of the casing is made of a slightly-larger diameter than the spindle throughout its length, so that the spindle D, resting on a flat step at the bottom, will fit loosely therein and be free to move laterally in all directions and to assume its own center of rotation with an unbalanced bobbin or load; and in Fig. 3 the spindle D is shown first mounted with an easy-running fit in a bolster-tube E, (shown separately in Figs. 5 and 6,) positively restrained from turning, and this bolster is then inserted in the casing-tube F B, so as to fit loosely therein and to be free to move in a similar way. This latter construction particularly will be fully understood by a reference to my prior patent, No. 363,425, dated May 24, 1887, and by those accustomed to manufacturing the spindle therein described, the construction here shown in Fig. 3 being similar to that of that patent. The construction here shown in Fig. 1, and what is meant by stating that the spindle is fitted loosely in the tube of the casing, will be understood by observing that the bolster-tube E of Fig. 3 is there omitted, but that the same amount of space which is there shown between the bolster and its casing is transferred so as in Fig. 1 to be around the spindle itself and between it and the tube F B, thus permitting a similar lateral movement to the spindle. Where a bolster-tube is employed, it should be positively restrained from turning, as described in my said prior patent, and as shown by a lug *e*, Fig. 5, which engages with a slot or opening on the top of the casing. The spindle-tube and, where it is used, the bolster-tube also (see Figs. 1, 3, and 5) are cut away to permit the wheels forming the bearing to engage themselves or come into direct contact with the spindle.

Where the whirl is brought below the bolster-bearing, as in Figs. 8 and 9, it is impossible of course to use a single full bolster-tube, but I have shown in Fig. 8 a short open tube E′ just above the whirl and a similar closed one for the step of the spindle, fitting loosely within the main tube of the casing and restrained from turning, in this instance by screws *e′* in place of the lug, which tubes fulfil the same office as the full bolster-tube as well as is possible with such a construction. In Fig. 9 I have shown similar short tubes (see F′) as in Fig. 8, but in this instance with the spindle fitting loosely within them while the short tubes themselves fit tightly within the casing, thus making an arrangement similar to Fig. 1. In any of these constructions the inside of the tube of the casing, or the inside of the bolster within which is located the spindle, is preferably made straight for most of its length, but that portion nearest the bottom has a slight taper and a step preferably made flat for the spindle to rest upon. The spindle itself is made tapering from the point *d* downward, and preferably with a flat bottom and slightly-chamfered edges. Above the point *d* it is a true cylinder.

The operation of this mechanism is as follows: The wheel or wheels form a bearing for the spindle to resist the strain of the driving-cord, which, from their relatively large size as compared with the diameter of the spindle and because they are mounted on small pins or axles, will greatly reduce the amount of friction and consequent power required. At the same time this bolster-wheel bearing being backed by the spring or other yielding pressure in connection with the loosely-fitting bolster, as in Figs. 3 and 8, permits of a free lateral movement that is relieved from jar or vibration and permits the spindle to assume its own center of rotation. The tension upon the spring should preferably be so fixed or regulated as to about offset the strain of the driving-cord, which will permit the spindle more readily to find its own center of rotation when its load is unevenly distributed. The mechanism is shown thus balanced in Fig. 1, where the spindle occupies the center of its tube and is free to assume either an oscillat-

ing or lateral movement, as may be required by variations in the load. When a spindle is running at its usual high rate of speed, it will of itself assume and preserve such a center of rotation, notwithstanding some excess of pressure upon its bearing; but if desired the metal frame carrying the wheel-bearing may be made to come into contact with the outside of the spindle-tube at the instant the bearing wheel or wheels are so located as to bring the spindle thus in the center of its tube, as is shown at *h* in Figs. 3 and 4, or some equivalent construction may be employed to arrest the sliding movement of the bearing in this position. In any case the movement of the wheel-bearing should be so stopped when the spindle is withdrawn from its tube that there will still remain space enough within the tube to insert the tapered end of the spindle when replacing it.

The oil-reservoir G upon the side opposite that where the antifriction wheel or wheels are located is made with an end extending only part way from the bottom, as at R, and is fitted with a movable or hinged cover S, which permits of easy access to it from the front of the frame. This construction prevents too large an amount of oil being placed in the reservoir. The cover S may project slightly over the end R, which will permit it to be easily raised by the spout of the oil-can. The wheel or wheels K are then made with long downwardly-projecting hubs, so as to keep the main portion of the wheels above the level of the oil, and these hubs are preferably made flaring at the bottom to prevent too large a quantity of oil rising upon the wheels. Where the whirl is placed above the bearing, the cover of the oil-reservoir (shown separately in Fig. 7) may carry upon itself a circular upright flange N to surround the upper end of the spindle-tube F of the casing, and to also inclose a circular flange O, projecting downwardly within it from the whirl P. The whirl proper is carried downwardly outside the upright flange N of the cover, and is brought as near as practicable to the cover, for it is evident that the only strain upon the spindle in running to pull it out of its natural center is that exerted by the driving-cord running upon the whirl, and whatever construction is employed the nearer the antifriction bolster-bearing is brought to the whirl the better it will oppose this strain. The flange O is also preferably made flaring at the bottom to throw off by centrifugal force any oil upon it within the upward flange N, and thus permit it to flow back into the reservoir. The whirl P, when possible, carries upon itself the bobbin-support X′ for the bobbin X, and where this is not possible a separate support for it may be attached to the spindle. Where the whirl is above the bearing, the usual hook Z, Figs. 1 and 3, is employed to prevent the spindle being pulled out when the bobbin is removed.

If desired, the mounting may be constructed so as to permit of greater or less tension being given to the spring L by means of the screw M, and I have so shown it in the drawings. The spring L may, of course, be replaced by other yielding pressure.

I am aware that ball-and-roller bearings variously arranged have been shown and patented for use with spindles; but although such bearings are very useful where the speed of rotation is low, they are useless with such high speeds as that attained by a modern spindle. I am not aware, however, that a bearing composed of wheels of comparatively large diameter, mounted upon fixed axles and backed by a spring or yielding pressure, has ever been used with a spindle before my invention.

I claim as my invention—

1. The combination of a spindle-casing having a spindle-tube with a closed bottom and a box-like extension near the top of the tube, a spindle mounted to fit loosely within the spindle-tube, and a wheel or wheels yieldingly mounted in the box extension so as to be slightly movable back and forth and to form an antifriction-bearing for the spindle and to resist the pull of the driving-cord, substantially as described.

2. The combination of a spindle-casing with a closed bottom, a bolster-tube having a step for the spindle and fitted loosely within said casing throughout its length, a spindle mounted in the bolster-tube, a box-like extension near the top of the casing, and a wheel or wheels yieldingly mounted in the box extension to form an antifriction-bearing for said spindle and to resist the pull of the driving-cord, substantially as described.

3. The combination of a loosely-mounted spindle with a step therefor, a bearing for the spindle consisting of a movable frame carrying a wheel or wheels mounted therein, and a spring to keep the wheel-bearing and spindle in contact and to resist the pull of the driving-cord, substantially as described.

4. The combination of a spindle-casing with a closed bottom, a spindle fitted loosely within said casing throughout its length thereby permitting free lateral motion of the spindle as a whole, a bearing for the spindle consisting of a frame carrying a wheel or wheels mounted therein, and a spring to keep the wheel-bearing and the spindle in contact and to resist the pull of the driving-cord, substantially as described.

5. The combination of a spindle-casing with a closed bottom, a bolster-tube having a step for the spindle and fitted loosely within said casing throughout its length thereby permitting free lateral motion of the bolster and spindle as a whole, a spindle mounted in the bolster-tube, means for positively restraining the bolster from turning, a bearing for the spindle consisting of a frame carrying a wheel or wheels mounted therein, and a spring to

keep the wheel-bearing and the spindle in contact and to resist the pull of the driving-cord, substantially as described.

6. The combination of a spindle mounted to fit loosely within a fixed casing, a bearing for the spindle consisting of a frame carrying a wheel or wheels, said wheels having downwardly-projecting hubs flaring out at their lower ends, an oil-reservoir surrounding the lower portion of said hubs, and a spring to keep the wheel-bearing and the spindle in contact and to resist the pull of the driving-cord, substantially as and for the purpose described.

7. The combination of a spindle-tube with a closed bottom, a spindle fitted loosely within said tube throughout its length thereby permitting free lateral motion of the spindle as a whole, a bearing for the spindle consisting of a frame carrying a wheel or wheels and permitted to slide back and forth toward and away from the spindle, a spring tending to keep the wheel or wheels in contact with the spindle and to resist the pull of the driving-cord, and a stop for the bearing so located that the bearing will come into contact with it when the spindle is about the center of its tube, substantially as described.

8. The combination of a spindle mounted loosely within a fixed casing, a bearing for the spindle consisting of a yielding frame carrying a wheel or wheels mounted therein to form a bearing for the spindle and to resist the pull of the driving-cord, and means for increasing or decreasing the pressure exerted upon said frame, substantially as described.

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Witnesses:
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