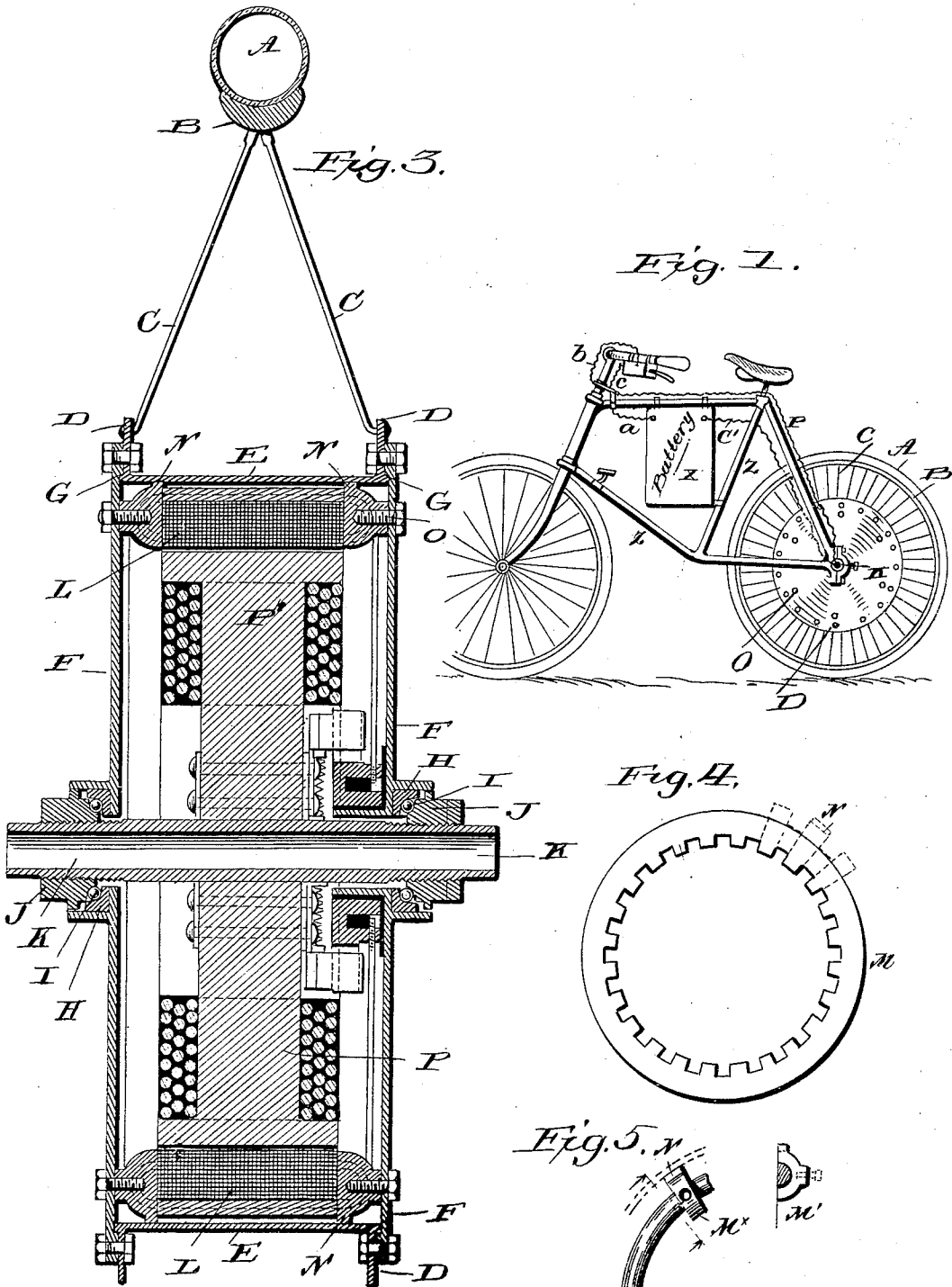


O. BOLTON, Jr.  
ELECTRICAL BICYCLE.

No. 552,271.

Patented Dec. 31, 1895.



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*L. C. Hills*  
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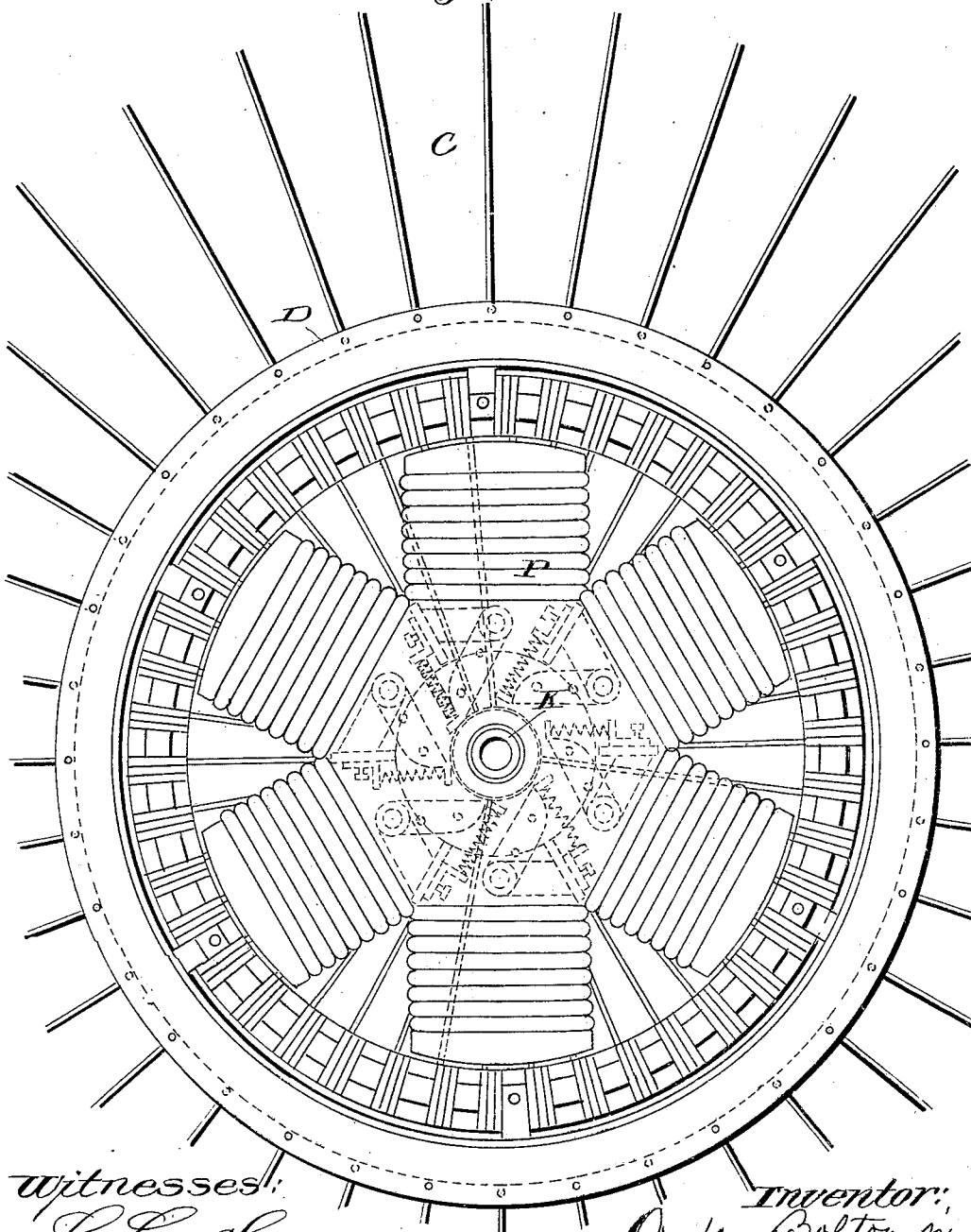
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Fig. 2,



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Fig. 6.

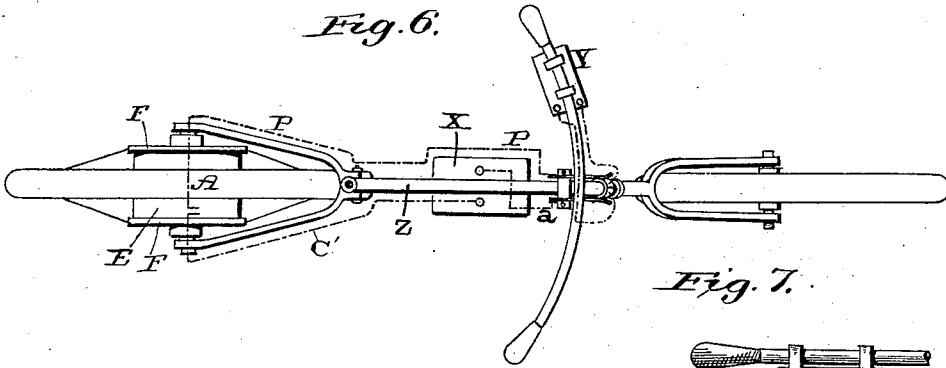


Fig. 7.

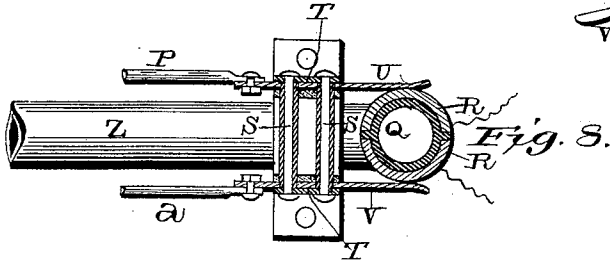
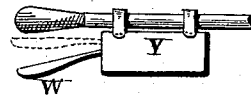


Fig. 8.

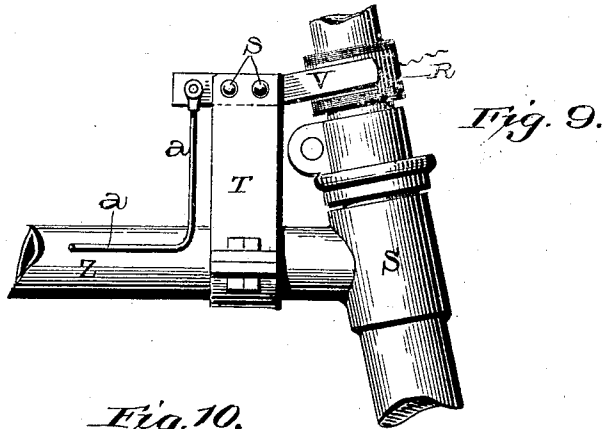
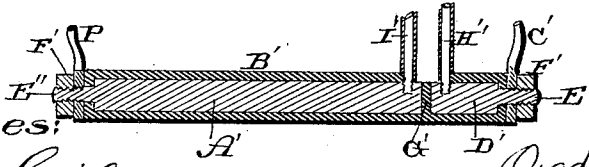


Fig. 9.

Fig. 10.



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# UNITED STATES PATENT OFFICE.

OGDEN BOLTON, JR., OF CANTON, OHIO.

## ELECTRICAL BICYCLE.

SPECIFICATION forming part of Letters Patent No. 552,271, dated December 31, 1895.

Application filed September 19, 1895. Serial No. 563,002. (No model.)

*To all whom it may concern:*

Be it known that I, OGDEN BOLTON, Jr., a citizen of the United States, residing at Canton, in the county of Stark and State of Ohio, have invented certain new and useful Improvements in Electrical Bicycles; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

My invention relates to an improvement in electric bicycles; and it consists in, first, a revolving armature carried by the wheel, the field-magnet, and the operating parts inclosed within an outer ring, and side plates which protect the parts from moisture and dirt; second, the hollow axle, the rods embedded in insulating material placed therein, and the conducting-wires secured to the inner and outer ends of the rods; third, the battery, the rheostat placed upon the handle-bar, the bearing-surfaces upon the post, the contact-points and the conducting-wires which connect the parts, all of which will be more fully described hereinafter.

The objects of my invention are to secure the armature to the plates which not only inclose the operating parts, but have a portion of the ball-bearings connected to their inner edges, to inclose all of the operating parts so that they are protected both from the weather and injury, and to secure the inner ends of the spokes to the ring which incloses the armature.

In the accompanying drawings, Figure 1 is a side elevation of a bicycle to which my invention is applied. Fig. 2 is an enlarged view of the central portion of the motor-wheel, the side plate being removed. Fig. 3 is an enlarged vertical section of the motor-wheel. Fig. 4 is a side view of one of the plates out of which the armature is formed. Fig. 5 is a detail view of the casting. Fig. 6 is a plan view of the bicycle, showing the wiring. Fig. 7 is a detail view showing the rheostat on the handle-bar. Figs. 8 and 9 are detail views of the contacts and the bearing-surfaces on the post. Fig. 10 is a detail showing the connections of the wires inside of the axle.

Z represents the frame of a bicycle, of any

suitable construction, and X a battery suspended therefrom. Extending from one pole of the battery is the wire *a*, which is connected at its front end to a contact V, and from the bearing-surface R, with which the contact makes connection, extends a wire *b*, which has its upper end connected to one post of the rheostat Y upon the handle-bar. The lever of this rheostat extends outwardly from one end in such a position that it can be grasped by the hand in taking hold of the handle. From the other post upon the rheostat extends the wire *c*, which makes connection with the second bearing-surface with which the contact U makes connection. These two contacts U V are secured at their rear ends to the support T, which is secured to the frame of the bicycle, and have their front ends bear against the conducting-surfaces R R upon the post S, and which bearing-surfaces are separated by the insulating material Q, which may be arranged around the post, as shown in Fig. 8, or in any other way that may be preferred. The upper end of the support T is braced together by the two bolts S, which extend horizontally through it, and which are insulated from the contacts, as shown. The lower portions of the supports T are also insulated from the frame in any suitable manner, and the brushes are also insulated from each other. Extending from the rear end of the contacts U is the wire P which connects to the rod A' which is embedded in the insulating material B' which is to be inserted into the hollow axle K. Extending from the other pole of the battery is a wire C' which is connected at its lower rear end to the short rod D' which is embedded in the other end of the insulating material B', as shown in Fig. 10. The wires P C' have eyes formed upon their ends, and these eyes pass over screw-threaded contracted ends E' E'' of the two rods A' D', and then the wires are locked in position by means of the nuts F'. As shown, the insulating material B' is divided by the vertical partition G' for the purpose of separating the rods A' D' from each other, and from these rods extend the two insulated wires H' I' to the commutator and thence to the armature and field-magnet in the usual manner.

A is an ordinary pneumatic tire of any desired construction; B, the rim; and C, the two sets of divergent spokes which are secured at their inner edges to the flanges D of the in-

closing ring E which extends around the armature. The flanges D are formed upon the ring E not only for the purpose of having the spokes secured to them, but for the purpose of having the two side plates F bolted thereto, as shown. For the purpose of making a perfectly tight joint between the flanges and the edges of the plates F, a corresponding shoulder G is made on both the plates F and the ring E, so that when the parts are fitted together they will brace each other and effectually exclude all dust and moisture from the operating parts.

The plates F form the sides of the inclosure in which all of the operating parts of the motor are placed at the same time that they serve to support the armature in position and carry at their inner edges the cones H against which the antifriction-balls bear. The other cones J upon which the balls bear are secured to the hollow axle in the usual manner. This axle or shaft is made hollow to receive the devices shown in Fig. 10 and described above.

The armature L is composed of a large number of thin plates M, as shown in Fig. 4, and which are provided with grooves upon their inner edges, and around which plates wire is wrapped in the usual manner. Applied to each outside face of the armature is a circular casting M', which is flat upon one side and semicircular upon the other, as shown in Fig. 5, and which casting M' is provided at intervals with a projection N, as shown in Figs. 3, 4 and 5, and which projections or flanges extend beyond the outer edges of the other portions, so as to form bearings for the ring E, as shown in Fig. 3. In making the armature these two outside rings or stampings M' are clamped in position against the ends of the armatures by means of clamps, and wires are wound at intervals to hold the parts tightly together, and then the clamps are removed and the armature wound in the ordinary manner. The armature is then trued up by taking a cut off of the lugs or projections M upon the rings while the armature is held in a lathe, and then the lugs upon the rings are drilled and tapped out to take the studs O which hold the plates F securely in position.

A hollow shaft or axle K, around which the armature revolves by means of the plates F and the bearings H I J, is fastened securely to the frame of the bicycle by means of the set-screws or other mechanical devices, and to this shaft is securely fastened the field-magnet P' which is of the multipolar type. Six poles are here shown, though four or eight poles would be about equally as satisfactory. This field-magnet is preferably fastened to the hollow shaft by shrinking it on, and after being trued up the armature will revolve around the poles of the magnet. As shown, this motor is wound expressly to take a heavy current at a low voltage—for instance, to carry one hundred ampères at ten volts.

A commutator is inclosed between the two plates F and is mounted on a hub on the inside of one of the plates. Six brushes bear on this commutator, three alternate ones being connected in parallel, as is often done in multipolar machines. This motor is connected up like any other motor that is wound in series, and the speed is varied by interposing various resistances from the rheostat in the usual manner.

Having thus described my invention, I claim—

1. An inclosing ring, to which the inner ends of the spokes are secured, combined with the side plates which are secured to the ring at their outer edges, and which protect the operating parts from dust and dirt, substantially as shown.

2. The flanged ring to which the inner ends of the spokes are secured, combined with the side plates which are secured at their outer edges to the flanges, and which plates have secured at their inner edges a portion of the ball bearings, substantially as described.

3. The hollow shaft, the rods insulated therein, and having the wires connected thereto, the field magnet secured to the shaft, the supporting plates F, carrying a portion of the ball bearings, and provided at their inner edges with a hub for the commutator; and the inclosing ring E, secured to the outer ends of the supporting plates, combined with the armature, the castings applied to its opposite ends, the spokes, and the pneumatic tire, substantially as shown.

4. In a bicycle, the battery suspended from the frame, a wire extending from one of its poles, the insulated bearing surfaces upon the post, the rheostat upon the handle bar, the contact points which bear against the insulating surfaces, and connecting wires, combined with the wire C' which extends from the other pole of the battery, the supports to which the contacts are secured, and the wire P, substantially as specified.

5. The armature composed of a series of thin plates M suitably wound, the castings M' held against the outside faces of said armature, projections about the circumference of said castings, combined with the ring E and supporting plates and means for holding said plates to the castings and armature, substantially as shown and described.

6. In combination with the hollow shaft, the insulating material B' carried therein, a partition G', the rods A' and D', the wires P and C' having eyes designed to be held over the contracted ends of said rods, combined with the wires H' and I', substantially as and for the purpose set forth.

In testimony whereof I affix my signature in presence of two witnesses.

OGDEN BOLTON, JR.

Witnesses:

AUSTIN LYNCH,  
DAVID B. DAY.