No. 688,150. Patented Dec. 3, 1901.

J. DARLING.

ELECTRIC MOTOR.

(Application filed June 5, 1901.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 1.

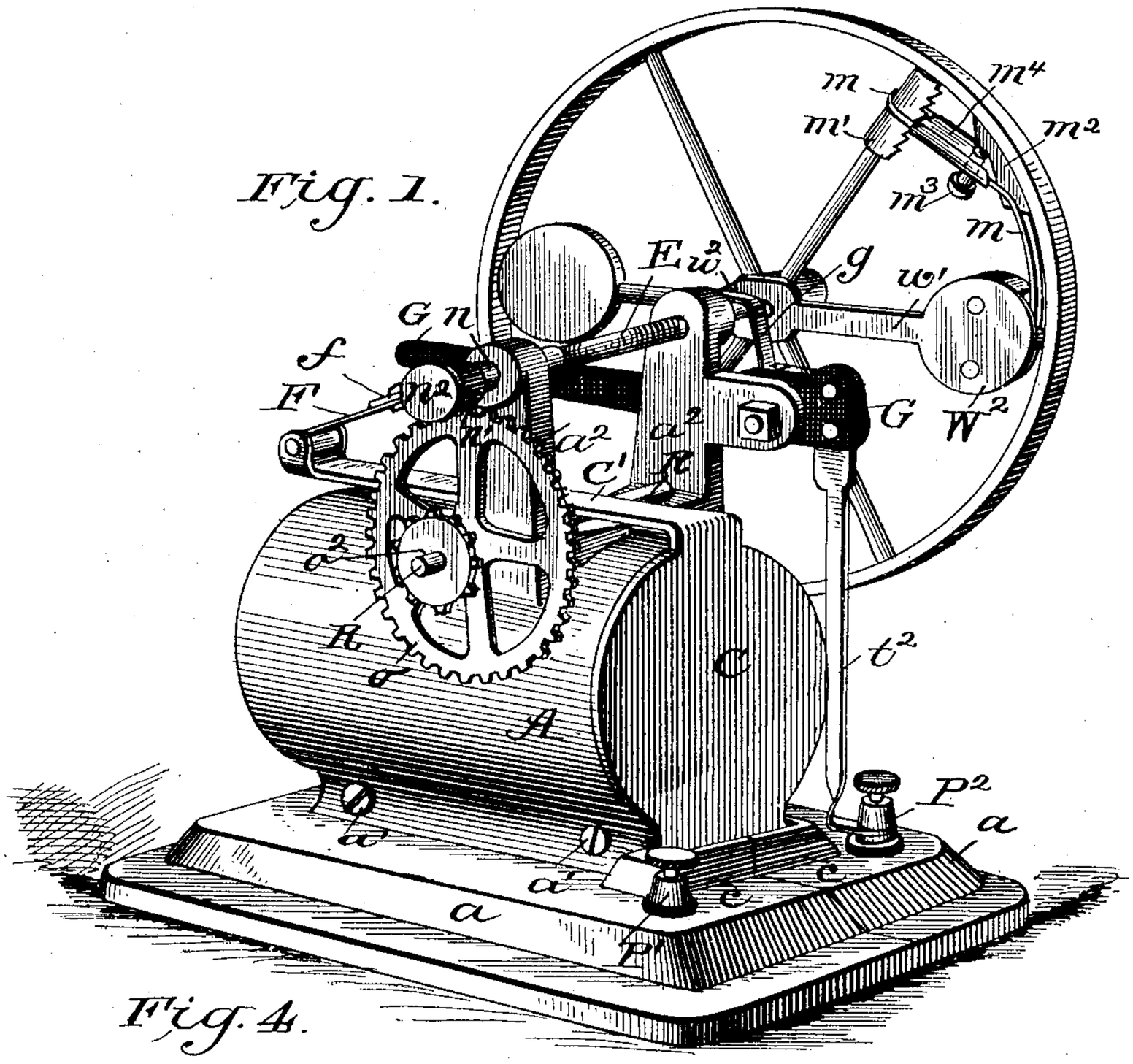


Fig. 4.

Fig. 5.

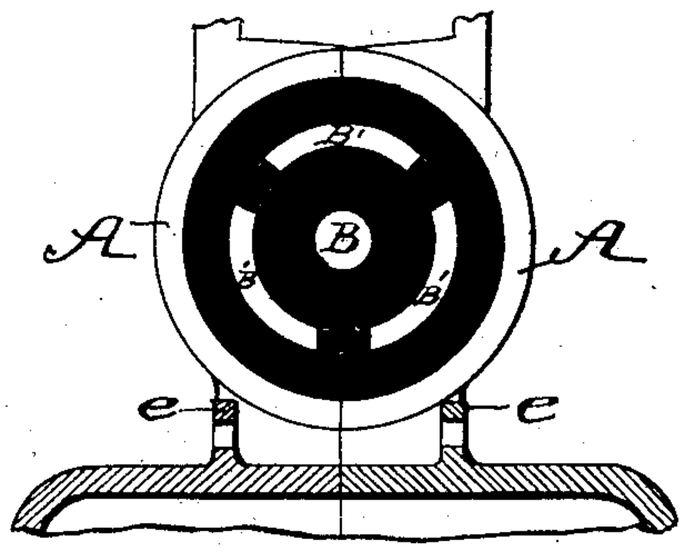


Fig. 12.

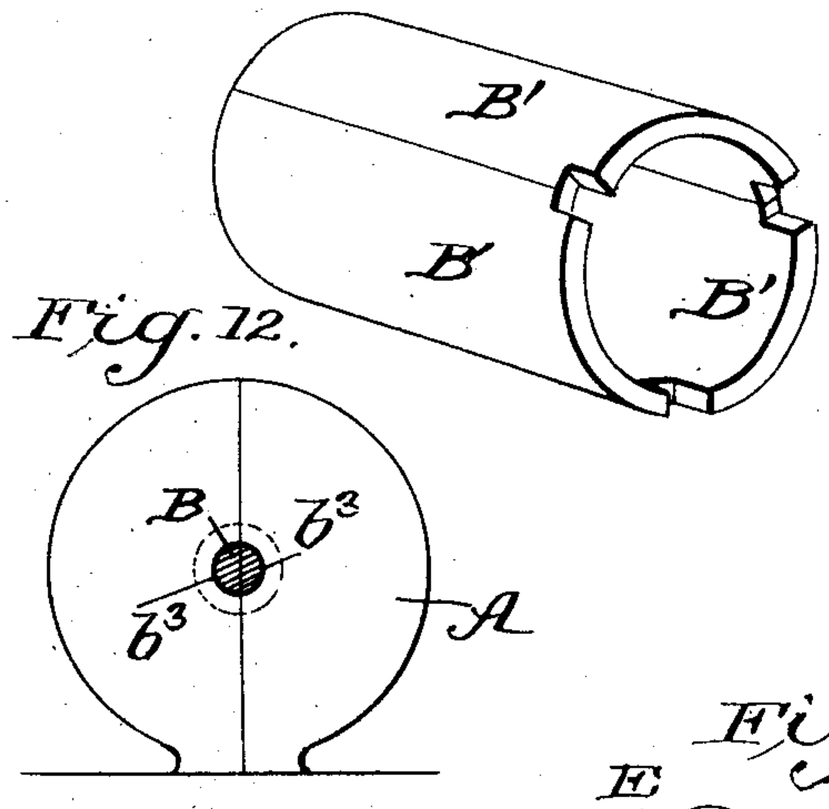
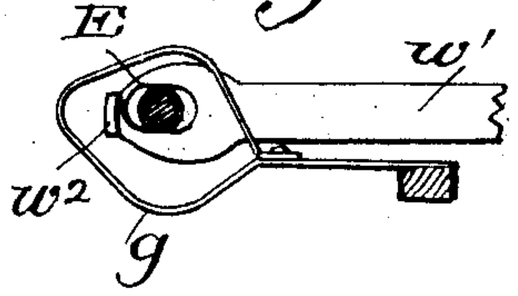


Fig. 6.



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No. 688,150. Patented Dec. 3, 1901.

J. DARLING.

ELECTRIC MOTOR.

(Application filed June 5, 1901.)

(No Model.) 2 Sheets—Sheet 2.

Fig. 2.

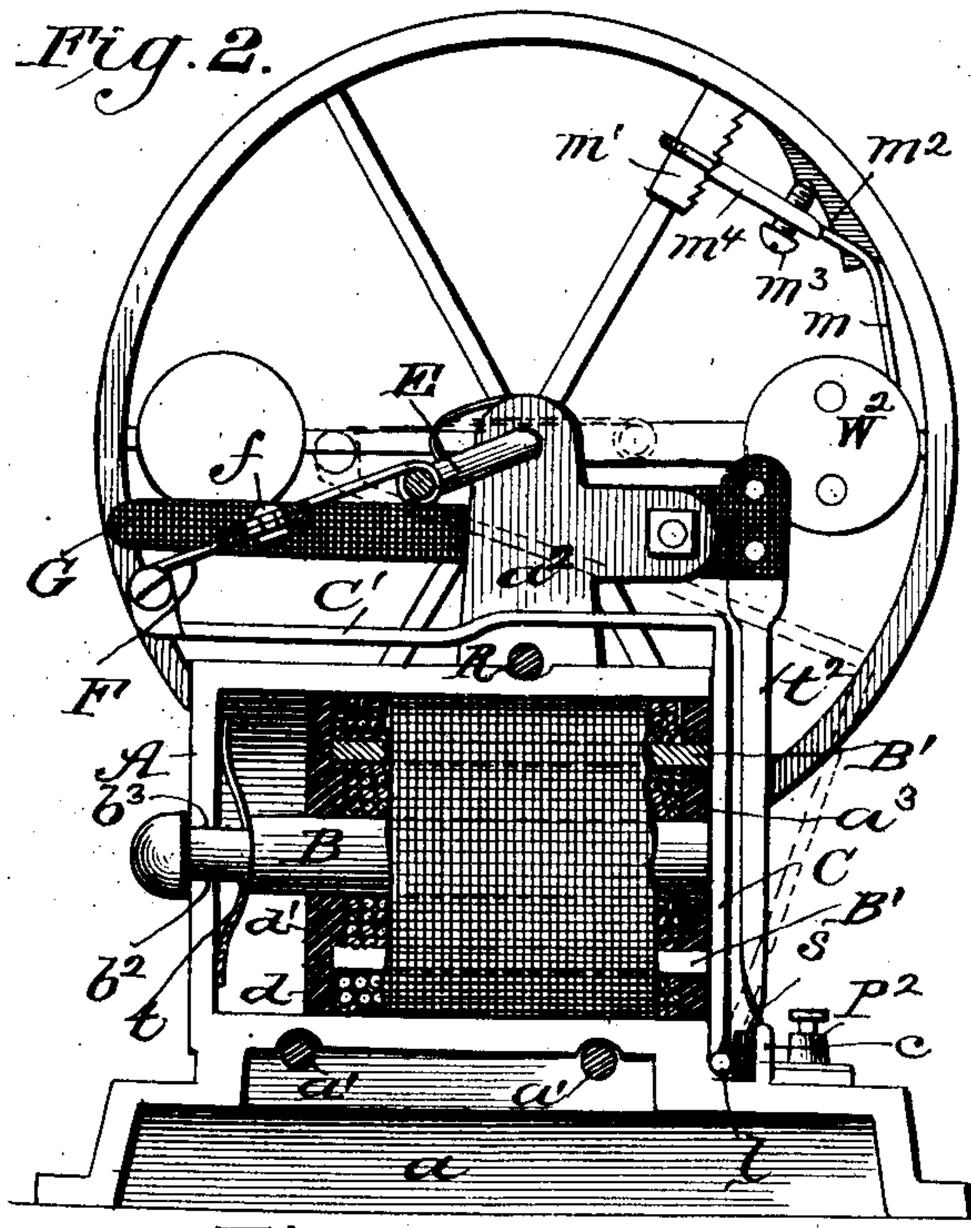


Fig. 3.

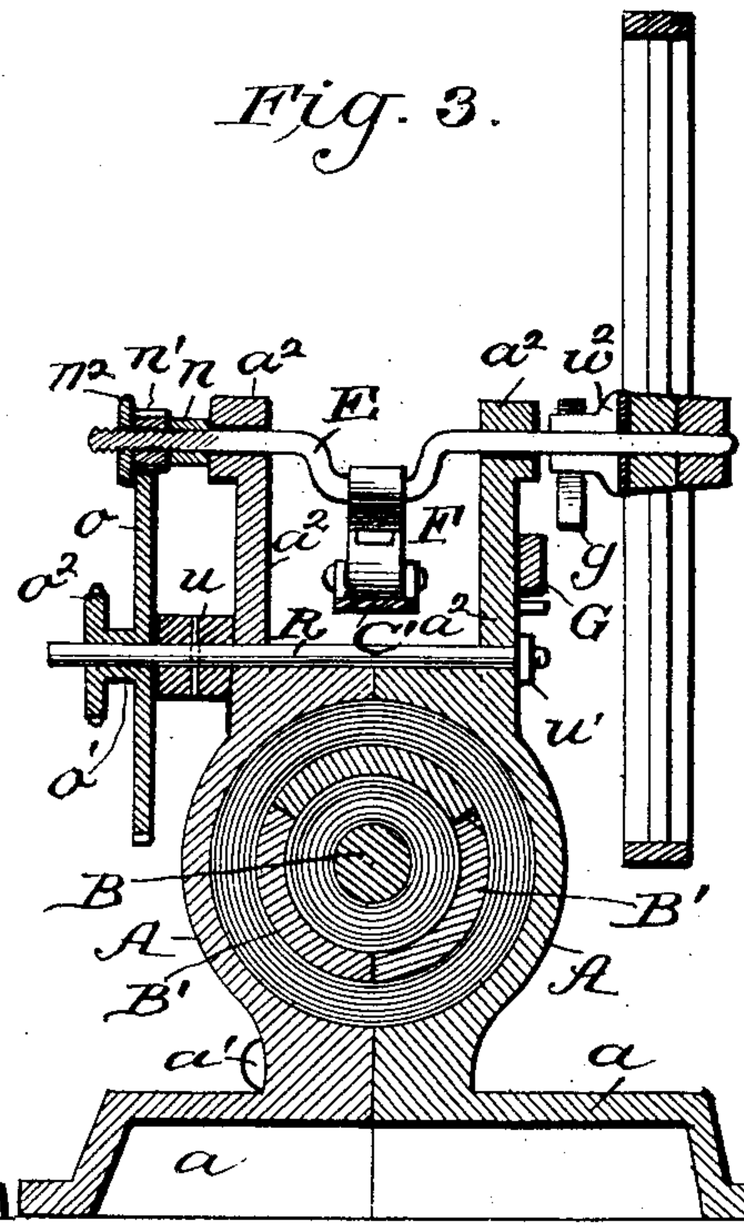


Fig. 11.

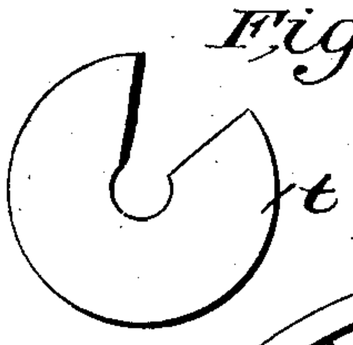


Fig. 8.

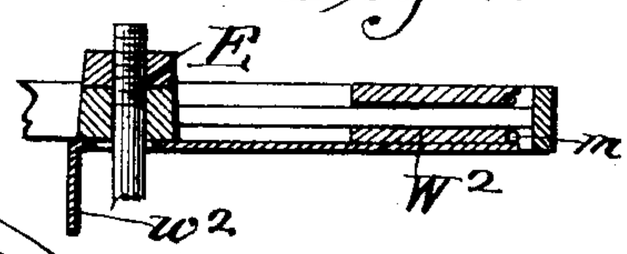


Fig. 7.

Fig. 13.

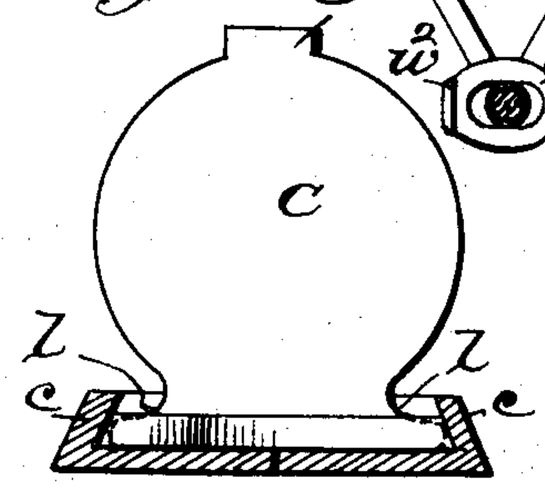


Fig. 10.

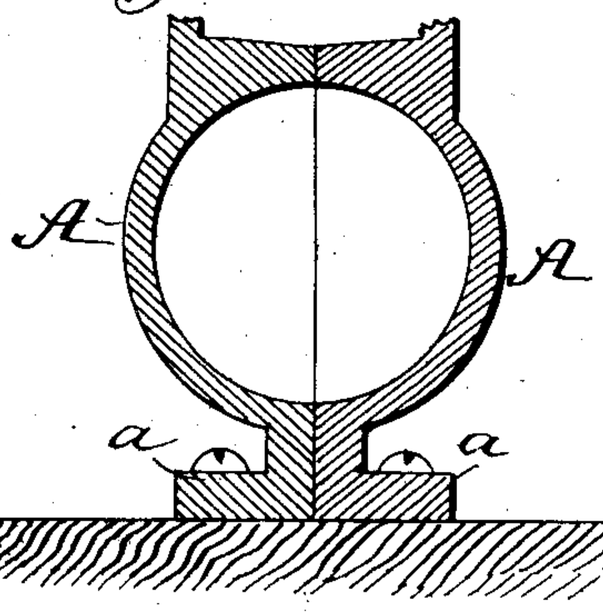


Fig. 9.

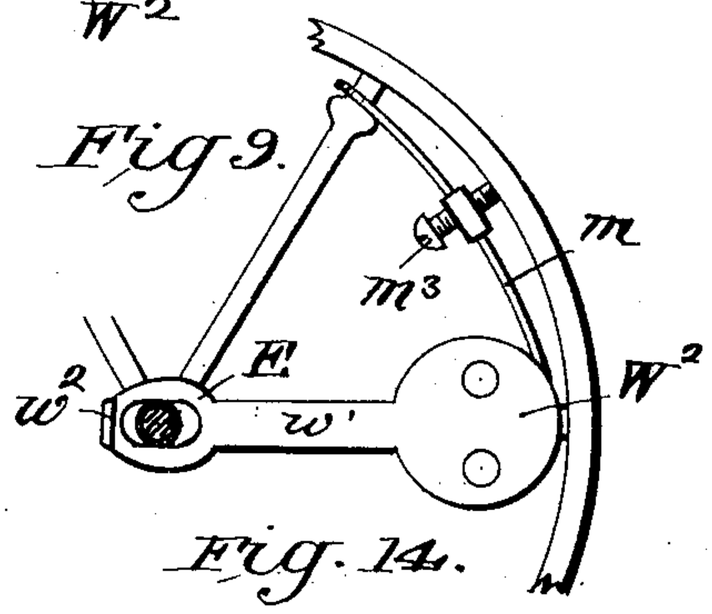
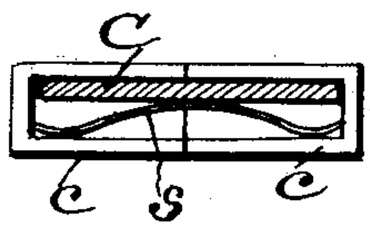


Fig. 14.



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UNITED STATES PATENT OFFICE.

JOSEPH DARLING, OF CHICORA, PENNSYLVANIA.

ELECTRIC MOTOR.

SPECIFICATION forming part of Letters Patent No. 688,150, dated December 3, 1901.

Application filed June 5, 1901. Serial No. 63,260. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH DARLING, of Chicora, in the county of Butler and State of Pennsylvania, have invented a new and useful Improvement in Electric Motors, of which the following is a specification.

My invention is in the nature of an improvement upon the electric motor for which Letters Patent No. 662,772 were granted me November 27, 1900; and it consists in certain features of construction and arrangement designed to simplify and improve the motor, to facilitate the putting of the parts together, and to so cheapen its construction as to permit it to be made and sold within the limits of the price of a toy.

Figure 1 is a perspective view of the motor. Fig. 2 is a vertical longitudinal section taken centrally through a part of the electromagnet. Fig. 3 is a vertical transverse section. Fig. 4 is a perspective view of the hollow cylindrical core. Fig. 5 is an end view of the electromagnet, with the base in section. Fig. 6 is a detail of the commutating devices. Fig. 7 is a sectional detail through the automatic speed-governor. Figs. 8 and 9 are modifications of the governor. Fig. 10 is a section view of a modification of the casing, and Figs. 11, 12, 13, and 14 are details.

The general features of an iron base a, an iron casing A for the electromagnet, with standards a^2 cast thereon, the armature C at the end of the magnet, and a horizontal crank-shaft journaled in the standards and connected to the armature by a pitman and arm and having a fly-wheel at one end, with automatic governor-switch, are substantially the same as those already shown in my said former patent.

In my present invention the base a, case A, and standards a^2 are cast in two separate sections, which join together in the middle vertical plane of the electromagnet to form a complete inclosing case and base. These two sections are screwed or bolted together by horizontal bolts a' a' passing through that portion of the casing between the semicylindrical shell and the base. The object in making the casing, base, and standards in two symmetrical sections is to permit said parts to be cheaply drawn from the mold in casting without coring, to permit the parts to be cheaply and quickly assembled in building up the motor, and to secure other results, as will be hereinafter described.

The electromagnet within the case A has a central core B, whose end opposite the armature C protrudes through the casing and is formed with a circular groove b^2. In the ends of the two sections A of the casing are formed semicircular notches b^3, Fig. 12, smaller in diameter than the core and extending down into the groove b^2 of the core, so that when the two sections of the casing are brought together to a close fit the head portions of the casing clamp and hold the core so that it cannot move endwise in response to the pull of the armature at the other end. This constitutes a second advantageous result flowing from the casting of the casing in sections. Still another feature related to the casting of the case and base in symmetrical halves is to be found in the means for securing the rocking armature C in its seats. On the adjacent parts of the base a a are cast the half-pockets c c, which draw from the mold in a direction at right angles to the plane of the joint of the case, but which pockets when put together (see Fig. 13) form a smaller opening at the top than they have at the bottom, so that the ears or lugs l l at the bottom of the armature when inserted between the pocket-sections and the latter are brought together in assembling the two halves of the casting inclose and retain the lugs of the armature, so that the latter will not drop out of place even if the motor is inverted. To prevent looseness at the rocking seat of the armature and to hold the armature up to close contact with the electromagnet-pole, a bowed spring s, Fig. 14, is arranged in the pocket behind the armature. In some forms of my device I may not use these pockets, but may employ perforated ears e, as seen in Fig. 5, which may be equally as well cast on the base-pieces, so as to draw from the mold.

In constructing the armature C it is stamped in one piece out of heavy sheet-iron, with an extension-arm C′, which is bent at right angles to the part C, Fig. 1, and formed on its

end with upturned lugs to receive the pintle-pin which connects it to the connecting-rod F, which secures it to the crank of the crank-shaft E, journaled in the tops of the standards a^2. The connecting-rod F is made in two sections connected together in the middle by a slip-joint clamped by a clamp-screw f, so as to take up looseness between the crank-shaft and arm C'. In this connection another advantage in making the casing and the two standards a^2 a^2 in separate pieces is to be seen, for in applying the crank-shaft no journal-boxes are required in the tops of standards a^2, but the tops have journal-holes cast in them, and the crank-shaft, with its ends freed of the wheels, is placed between the standards a^2 a^2, and the latter are then brought together to protrude the ends of the shaft through the bearing-holes in the tops of the standards.

The electromagnet which I employ is one which has two or more concentric helices, with both a central core and also another cylindrical core between the two helices, as shown in my previous patent. This is not broadly a new feature; but in cheaply and conveniently constructing an electromagnet of this kind I make the cylindrical core (see Fig. 4) in two or more longitudinal sections B' B' B', and when the inner helix is wound these cylindrical core-sections are simply laid on the same and the winding continued outside of them. These core-sections have their ends slightly reduced and protruded through the hard-rubber washer a^3, so as to hold said core-sections in place. The electromagnet thus formed has its opposite end closed by a disk d, upon whose shoulder d' the core-sections B' are lapped, and which disk is fitted within the case A. This electromagnet may be made as short as desired and need not fill the whole case, as shown. Between the central core and the inner end of the case a spring-washer t is placed, which takes up all looseness between the case and core.

P' P^2 are the two binding-posts through which the battery-current is taken to the coils of the electromagnet. One of these, P', connects with one terminal of the double helix and the other one, P^2, connects with the other terminal of the helix through the metal strip or wire t^2, the spring switch or brush g, and the commutating devices of the governor, substantially in the same manner as in my previous patent, except that the switch g instead of being two-pronged, as in my former patent, is a spring-loop whose opposite sides are brought alternately into contact with the commutating device by the lever G, according as the motor is to be run in one direction or the other.

W^2 is a weight sliding on one of the spokes of the fly-wheel and having a shank w' and a commutating bearing w^2, which comes in contact with the spring-switch g. This weight is designed to fly out from centrifugal action when the motor goes too fast, so as to take the commutating-face away from the brush or spring switch g and cut off the electrical current, and thus automatically reduce speed in the general manner shown in my previous patent. The spring for forcing the weight inward and means for adjusting its tension are, however, different. In the present invention the spring m is shaped somewhat like a hair-pin, being double-branched and lying in a somewhat parallel relation to the rim of the wheel just inside of the same. The bent middle portion is hooked around the spoke adjacent to the one carrying the sliding weight and is held in place by a notched enlargement m' on the spoke. The two branches of the spring straddle a slight fin m^2 on the inner periphery of the wheel-rim, and the two ends of the branches of the spring rest upon and press the weight inwardly. A set-screw m^3 is tapped through a flat collar m^4 on the two legs of the spring and bears against the rim of the wheel, so as to regulate the pressure of the spring on the weight. By putting the loop end of the spring into one or the other of the notches on the enlargement m' the position of the spring may be slightly changed. As a modification of these devices the spring may be arranged as in Figs. 8 and 9.

In Fig. 9 a mere enlargement on the spoke holds the end of the spring without any notches for adjustment. In Fig. 8 the tension of the spring is regulated by a sliding friction-sleeve m^5 on the spoke, the spring tilting about the fin m^2 as a fulcrum.

In transmitting the motion of the crank-shaft E through suitable reducing-gears to points of utilization the end of the crank-shaft (see Fig. 3) is provided with a rigid boss n, and outside of this is screw-threaded. A small pinion n' is provided with a screw-threaded opening and is turned on the threaded end of the shaft like a nut, and a large jam-nut n^2 is screwed on outside the pinion and made to lock the pinion rigidly to the crank-shaft. This jam-nut is of a diameter somewhat greater than the pinion. This pinion engages a large gear-wheel o, which has a hub o', provided with a sprocket-wheel o^2 to receive a chain belt for driving advertising figures or operating any kind of machinery or moving toys. This gear-wheel o turns loosely on the end of a shaft R and requires no special means for preventing it from slipping off the end other than the devices already described, since the jam-nut n^2 overlaps the edge of the gear-wheel o sufficiently to keep it from coming off. The shaft R is not only an axis for the gear-wheel o, but is a clamping-bolt for holding the upper parts of the casing and standards a^2 together. For this purpose it is provided with a rigid hub or shoulder u, which bears against one of the standards a^2, and thence extends

through the other standard and terminates in a screw-threaded end with nut w', which when screwed up tight holds the parts of the casing together.

To reduce the weight of the motor, I may make the greater part of the base of wood, as shown in Fig. 10, only forming on the bottom of the magnet-casing A a slight outturned flange a to permit it to be screwed to the wood base.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In an electric motor, a metal casing for the electromagnet made in two parts and each bearing a portion of the shell for the magnet, a standard for the crank-shaft, and a basic flange, all made in one piece, and bolts for connecting these two parts together substantially as described.

2. In an electric motor, a metal casing for the electromagnet made in two parts and each formed in one piece and bearing a portion of the shell for the magnet and a rocking seat or bearing for the armature-pivots at the end of the casing, bolts connecting these two parts, and an armature fulcrumed in said seats substantially as described.

3. In an electric motor, a metal casing for the electromagnet made in two parts and each formed in one piece bearing a portion of the shell for the magnet and a hollow pocket opening inwardly, bolts for securing the two parts together, an armature fulcrumed in said pockets, and a spring arranged in the pockets behind the armature to press the armature toward the magnet as described.

4. In an electric motor, a metal casing for the electromagnet made in two parts, a shaft passing through the two parts and provided with clamping devices acting as a bolt to hold the two parts together and extended at one end to form an axial shaft for a gear-wheel substantially as described.

5. In an electric motor, the combination of an electromagnet, its armature, and a crank-shaft connected to the armature, said crank-shaft being provided with a rigid pinion with a collar or flange at one side of the same, a parallel axial shaft, a loose gear-wheel thereon engaging the pinion and prevented from coming off by the flange or collar beside the pinion substantially as described.

6. In an electric motor, the combination of the crank-shaft, the electromagnet, an armature at the end of the electromagnet having a rigid arm extending from the armature beneath and past the crank-shaft, and a connecting-rod or pitman made of two slidable sections with clamping-screw, one section being attached to the crank-shaft and the other to the armature-arm substantially as shown and described.

7. In an electric motor, the combination of the crank-shaft, the armature, devices connecting the armature and crank-shaft, a switch, and an electromagnet made with both a central and a hollow cylindrical core and two helices, said cylindrical core being made of separate longitudinal sections of a cylinder substantially as described.

8. In an electric motor, the combination of a crank-shaft, the armature, devices connecting the armature and crank-shaft, a switch, and an electromagnet made with both a central and a hollow cylindrical core and two helices, said cylindrical core being made of separate longitudinal sections with reduced ends, a disk at one end of the magnet having openings to receive these ends, and a disk with shoulder to receive the other ends of said sections substantially as described.

9. An electromagnet comprising a central core, an outer casing, two concentric helices in said casing, and a hollow cylindrical core made in longitudinal sections and arranged between the helices substantially as and for the purpose described.

10. In an electric motor, the combination of an electromagnet having an extended central core, and an external casing for the magnet made in two sections bolted together upon and clamping the extended core to hold it against the pull of the armature substantially as described.

11. In an electric motor, the combination of an electromagnet having an extended central core with a groove in it, an external casing for the magnet having notches fitted into the groove of said core, and a spring arranged between the core and the casing to take up looseness substantially as described.

12. In an electric motor, the combination with the switch or brush, and the radially-sliding governor-weight having an electric contact for said brush, and a fly-wheel; of a spring arranged inside the rim of the fly-wheel and having one end crossing the radial line and pressing the weight inwardly, and an anchorage and adjusting device for said spring substantially as shown and described.

13. In an electric motor, the combination with the switch or brush, the radially-sliding governor-weight having an electric contact for said brush, and a fly-wheel; of a spring arranged inside the rim of the fly-wheel, said spring being branched and anchored at its bent end around a spoke of the fly-wheel, and having its other end extended across the weight at right angles to the radial line, and means for adjusting the tension of said spring substantially as described.

14. In an electric motor, the combination of the switch or brush, the radially-sliding governor-weight having an electric contact for said brush, a fly-wheel having an inwardly-projecting fin on its rim, a spring branched and anchored at its bent end around a spoke of the fly-wheel and straddling the fin and having its other end extended across the

weight at right angles to the radial line, and means for adjusting the tension of said spring substantially as described.

15. In an electric motor, the combination with the electromagnet; of an armature pivoted at the end thereof and made in one piece with a right-angular arm extending longitudinally along the side of the magnet, a crank-shaft crossing this arm, and a connecting-rod connecting the crank-shaft to the end of said arm substantially as described.

JOSEPH DARLING.

Witnesses:
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SOLON C. KEMON.