

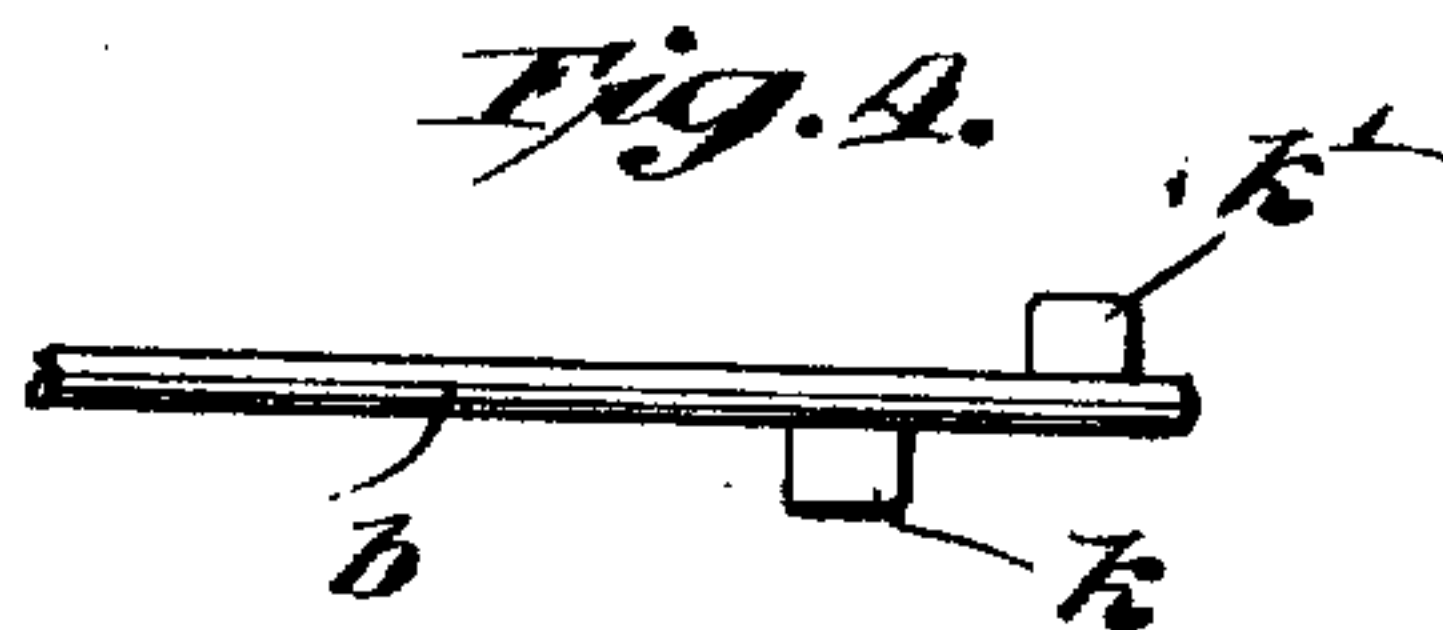
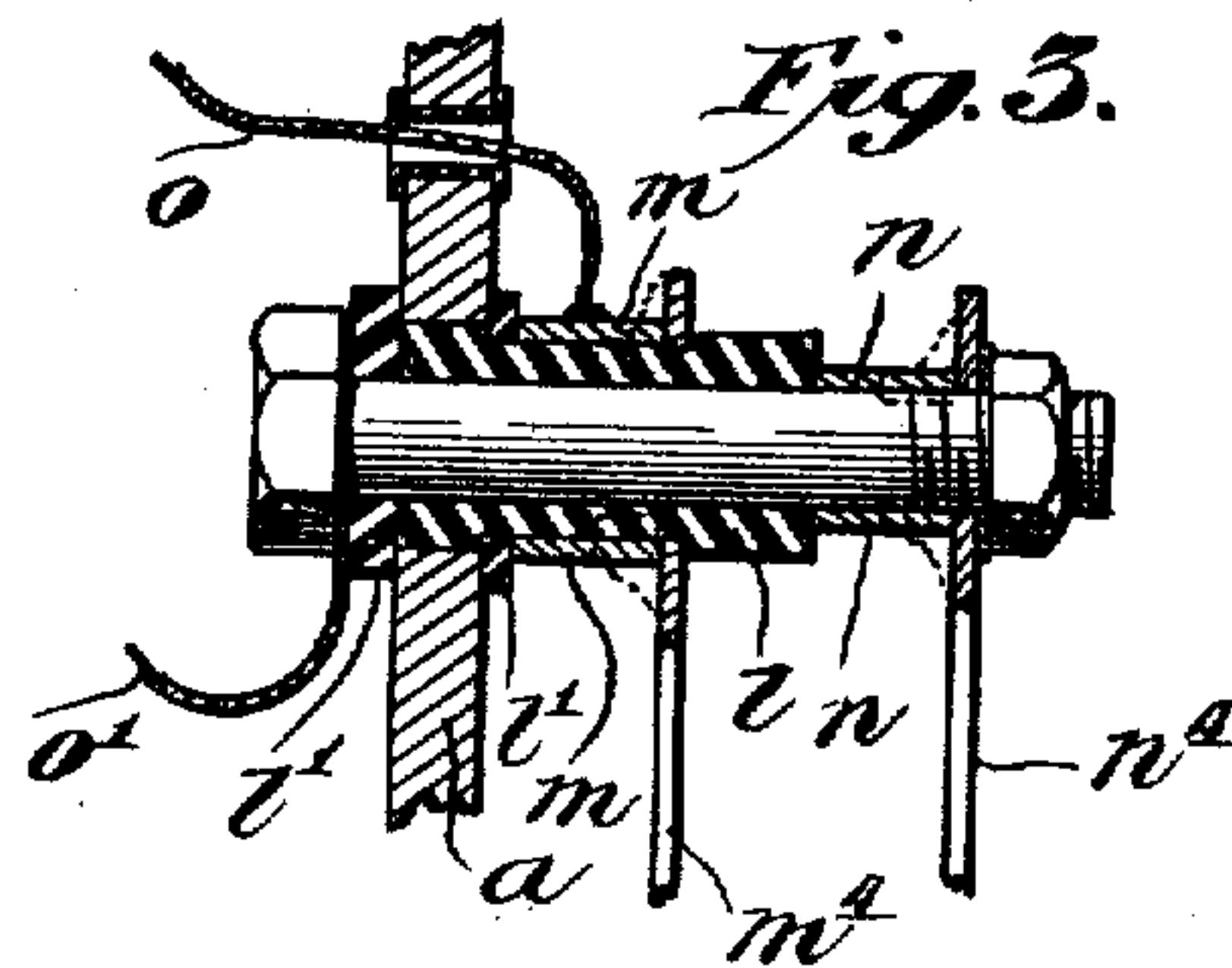
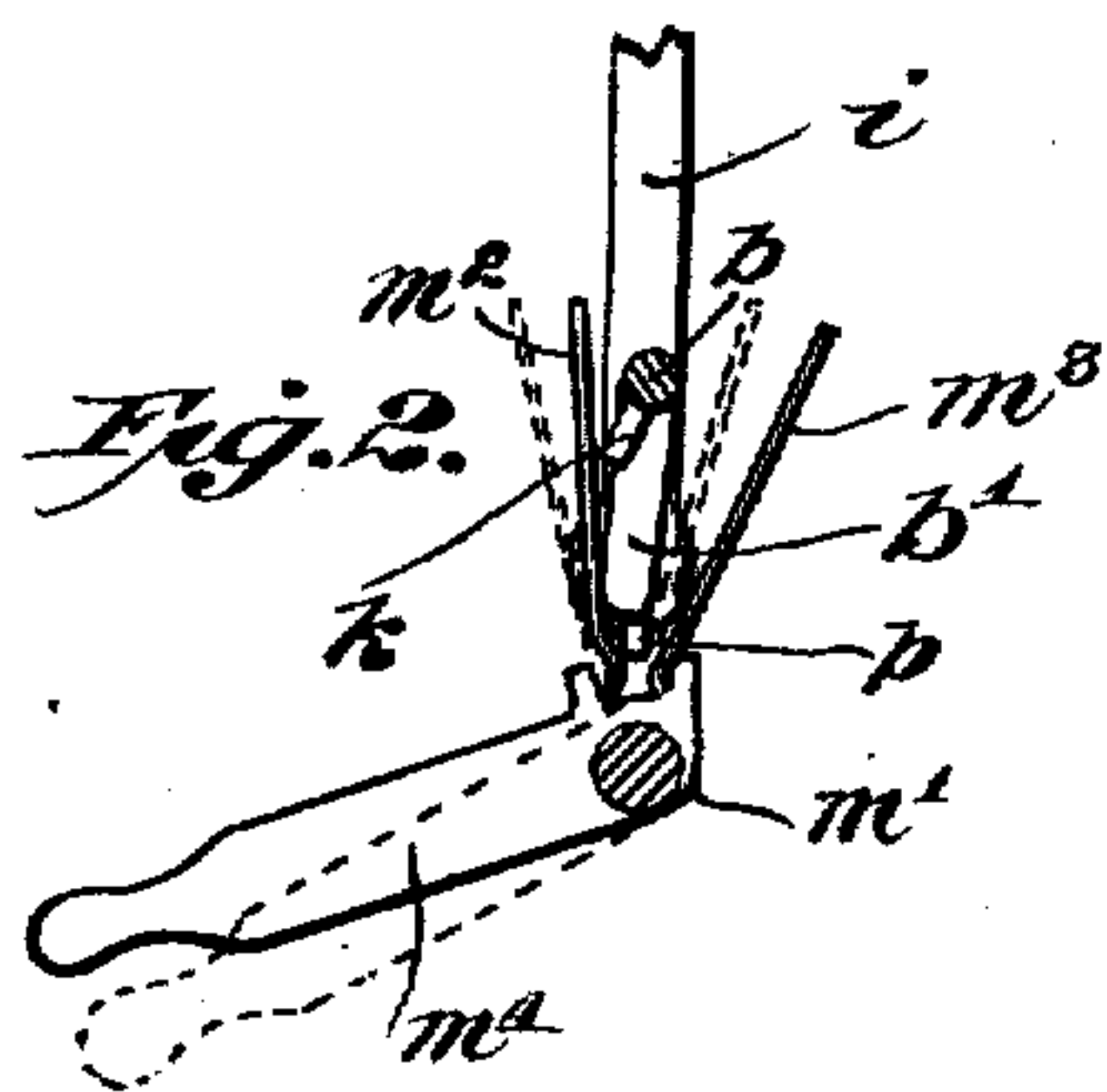
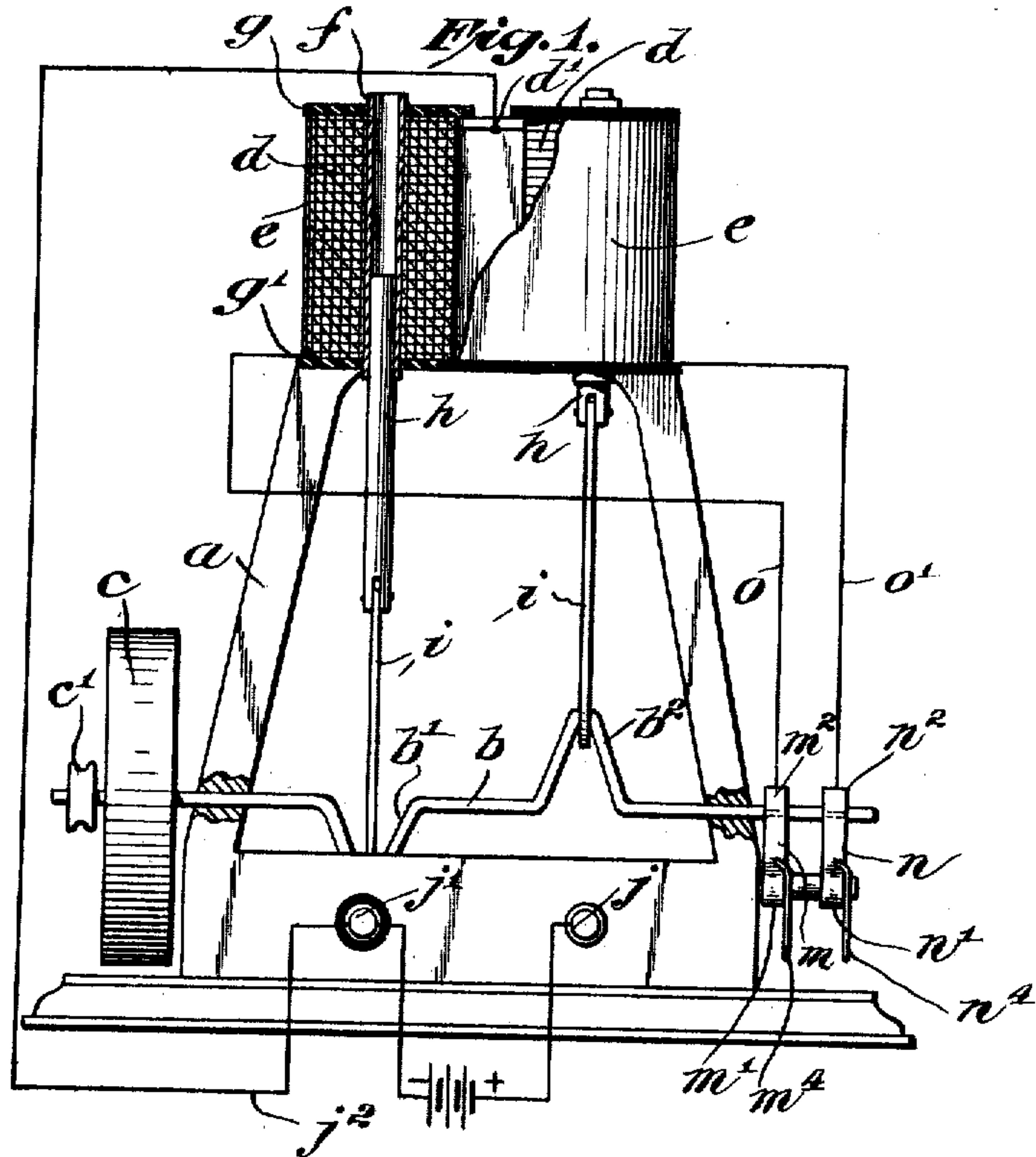
No. 830,800.

PATENTED SEPT. 11, 1906.

G. G. MORTIMER, JR.

GAME AND TOY.

APPLICATION FILED JULY 26, 1905.



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# UNITED STATES PATENT OFFICE.

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## GAME AND TOY.

No. 830,800.

Specification of Letters Patent.

Patented Sept. 11, 1906.

Application filed July 26, 1905. Serial No. 271,275.

*To all whom it may concern:*

Be it known that I, CHARLES G. MORTIMER, Jr., a citizen of the United States, residing in the borough of Brooklyn, in the city of New York, county of Kings, and State of New York, have invented certain new and useful Improvements in Games and Toys, of which the following is a specification, reference being had therein to the accompanying drawings, which form a part thereof.

My invention relates to games and toys, and more particularly to a class of electric toys.

The main object of the invention is to provide a toy in the form of an engine wherein the driving-power will be derived from an electrical circuit having therein a make-and-break mechanism actuated synchronously with the connecting-rod movement to alternately impart movement to said rod in one direction through the closing of the circuit and permit it to move freely in the opposite direction through the opening of the circuit.

A further object is to provide a toy of this character wherein the number of engine revolutions may be regulated by an adjustment of the electrical contacts to retard or expedite the closing of the circuit.

A still further object of the invention is to provide a simple system of wiring which will prevent short-circuiting, which will permit the aforesaid make-and-break of the circuit, and which will facilitate the connection of a battery therewith.

A still further object is to provide a simple reverse mechanism which will instantly throw over or reverse the direction of rotation of the engine-shaft merely through the regulation of the instant of the closing of the circuit.

A still further object is to provide a toy wherein a plurality of electroreceptive devices may be employed with a single source of energy to alternately actuate a plurality of individual connecting-rods to drive a shaft under constant power, and thus permit the simulation of a marine or similar type of engine and avoid the necessity for the employment of a fly-wheel.

A still further object is to provide in this type of toy employing a plurality of electroreceptive devices means whereby said devices may be individually controlled or cut out.

A still further object is to provide means, whereby the adjustable contact may not be operated to permanently close the circuit, and thus prevent the reciprocation of the connecting-rod, and a still further object is to provide a scientific toy which cannot readily get out of order and which will be inexpensive to manufacture.

The invention consists in such novel features of construction and combination of parts as are hereinafter set forth and described, and more particularly pointed out in the claims hereto appended.

Referring to the drawings, Figure 1 is a front elevation of a toy engine of a design similar to a type of marine vertical-cylinder engine, one of the imitation cylinders being shown in section to disclose the internal arrangement of the electroreceptive device, the legging being broken away to disclose a portion of the other device in elevation, and the electrical arrangement and circuit being shown diagrammatically. Fig. 2 is an enlarged side elevation of one of the adjustable contact-makers. Fig. 3 is an enlarged plan view of the make-and-break mechanism shown in Fig. 1; and Fig. 4 is a view of the end of the crank-shaft, showing the arrangement of the rotary contacts or tappets to alternately energize and deenergize each of the electroreceptive devices.

Like letters refer to like parts throughout the several views.

In the embodiment of the invention shown in the drawings, *a* indicates a frame in general design resembling an ordinary vertical marine-engine, journaled in which is a crank-shaft *b*, the cranks *b'* *b''* of which are set at one hundred and eighty degrees. Mounted on said shaft is a fly-wheel *c* and pulley *c'*, which, however, may be dispensed with if it be desired to apply the power direct, as to paddle-wheels, or the propeller of a toy boat.

Surmounting the frame *a* and lined up with the shaft *b* are a plurality of electroreceptive devices *d*. These devices are inclosed by a cylinder-legging *e*, so that the assembled device resembles ordinary steam-cylinders. Preferably each electroreceptive device is an ordinary solenoid, the windings of which are upon a hollow spool *f* and between insulating-heads *g* *g'*. Movable in said spool *f* is a metallic core *h*, preferably of soft iron, to which and to a crank of the crank-shaft is pivoted



a connecting-rod *i*. Said core is loosely mounted in said spool *f* to permit it to be centered within the solenoid when magnetized through the energizing of the coil, and to be moved freely without friction by the continued rotation of the shaft through momentum when said solenoid is deenergized. A solenoid is preferably employed because of the increased stroke possible by the range of movement of the core *h*.

Carried on the frame *a* are two binding-posts *j j'*, one of which, as *j'*, is insulated therefrom, while the other is in electrical connection therewith and therethrough with the shaft *b*. The post *j'* is connected by an insulated wire, as *j<sup>2</sup>*, with one terminal *d'* of each solenoid, and said posts respectively are adapted to be connected to the opposite terminals of a primary or secondary battery, or other source of electrical supply.

The shaft *b* has formed, cast, soldered, or driven thereon, so as to be in electrical connection therewith, a tappet or tappets *k k'*, corresponding in number to the cranks on said shaft. These tappets may be termed "rotary contacts," their function being to make the circuit by a rubbing contact with an opposed brush during a portion of each cycle of the corresponding crank and break it during the remainder of the cycle. These tappets *k k'* are each set relative to its own crank and brush and will vary with the disposition of the brush. If the axis of the said brush be directly beneath the shaft *b* in the vertical type of engine shown, the tappets will be substantially alined with their respective cranks, so that the brush-arms when in operative position will be substantially alined with the line of reciprocation of the connecting-rod *e*, so as to insure the energizing of the solenoid or other device at a period when the engine is off the center. If the arrangement of the brush be different, that of the tappet relative to the crank must be varied to insure the initial contact at a period when the engine has just passed the center.

Mounted on the frame *a* and insulated therefrom and from each other by means of the insulation-bushing *l* and washers *l'* are a plurality of metallic brushes *m n*, preferably of copper, alined with and adapted to be engaged by the respective tappets *k k'*. These brushes are respectively in electrical connection through the insulated wires *o o'*, respectively, in any desired manner with the other terminals of an individual solenoid *d*, the circuit being closed through said brushes. Each brush comprises a head *m' n'*, rotatably mounted on its support and having forked arms *m<sup>2</sup> m<sup>3</sup> n<sup>2</sup> n<sup>3</sup>*, (see Fig. 2,) which straddle said shaft *b* and project at an angle, which permits their being held out of contact with the tappets *k k'* or through the rocking of the brush brought, respectively, into contact therewith on opposite sides of the axis of said

shaft. Secured to each said brush *m n* is a lever-handle *m<sup>4</sup> n<sup>4</sup>*, by means of which the respective arms may be brought into the plane of rotation of the tappet *k* or *k'*. Also carried by the frame *a* is an insulating guide-block *p*, which limits the extent of movement of said brushes to prevent such movement being sufficient to close the circuit through contact of either arm with the periphery of the shaft *b*.

While I have shown the spool *f* as projecting beyond the head of the legging and as being open, the legging may be extended to cover this core, if desired, the structure shown being employed merely in the interests of economy of construction.

In describing the operation of the heretofore-described scientific toy I shall first refer to the operation of a single-solenoid engine and then amplify the description by reference to the mode of operation of a multiple-solenoid engine, inasmuch as broadly the operation in the two is the same, and also the particular make-and-break mechanism, broadly, with various types of electrical toys actuated by the energizing and deenergizing of an electroreceptive device. I shall also describe its operation with an ordinary dry-battery cell or cells developing an electromotive force of from one and one-fourth volts to three volts and an amperage of from two and one-half to seven. In starting the toy unless it is off the center it is necessary to rotate the shaft *b* and swing or rock the brush *m* upon its pivot until one arm *m<sup>2</sup>* thereof is in some part of the circle inscribed by the tappet *k*. As the said tappet wipes against said brush-arm a rubbing contact results, closing the electrical circuit until the continued rotation of the shaft carries the tappet over the horizontal center and breaks said contact, again opening the circuit. With the initial contact the battery-circuit is closed and includes the binding-post *j'*, the frame *a*, the shaft *b*, and the tappet *k* thereon and in electrical connection therewith, the brush *m*, the wire *o*, the solenoid or other electroreceptive device *d*, the wire *j<sup>2</sup>*, the binding-post *j*, and the battery-terminals connecting a battery with said binding-posts. The closing of the circuit energizes the said solenoid or other electroreceptive device, which polarizes the core *h* and draws it within the spool *f* until it is centered relative to the solenoid. This movement of the core *h* exerts a direct pull on the connecting-rod *i*, which continues the rotation of the shaft *b*. It will be observed that the tappet *k* being so set that when said crank is just past a center the tappet extends from a radius of the shaft *b*, which will not permit it to contact with the brush-arm *m<sup>2</sup>* prior to this period, thus insuring the closing of the circuit only when said crank has passed the center. To increase the speed of the toy, it is merely necessary to bring the arm *m<sup>2</sup>*



nearer the axis of the shaft *b*, thus insuring the closing of the circuit sooner and a longer interval before the circuit is broken. By simply moving this brush the speed may be run up as high as fifteen or eighteen hundred revolutions per minute. As the tappet *k* is rotated and approaches that point of the succeeding quadrant corresponding to that at which contact is made it passes away from the arm *m*<sup>2</sup>, breaking the circuit and permitting the completion of the cycle under the momentum of the wheel *c*, the deenergized solenoid permitting the core *h* to move freely during the return movement. If it be desired to reverse the engine, it may be thrown over by simply rocking the brush *m* until the arm *m*<sup>2</sup> thereof is out of the circle of rotation of the tappet or contact *k* and the arm *m*<sup>3</sup> thereof is brought within said circle at a point diametrically opposite to that formerly occupied by the arm *m*<sup>2</sup>. This results in the tappet or contact *k* engaging the arm *m*<sup>3</sup> before the crank reaches the center, thus closing the circuit and energizing the device *d*, instantly checking the rotary movement of the shaft *b* under the impulse acquired by the previous making of the circuit through the arm *m*<sup>2</sup> and again polarizing the core *h* and causing it to move within the spool *f* to a center exactly as heretofore described. This movement of the core reverses the direction of rotation of the shaft *b*. The speed of reverse may be controlled in exactly the same manner as with the direct movement. The guide-block *p* limits the extent of movement of the brush *m* and prevents the arm *m*<sup>2</sup> or *m*<sup>3</sup> thereof being rocked sufficiently to cause it to engage the shaft *b*, and thus permanently close the circuit.

It will be observed that the reversal of the engine is accomplished solely by the simple mechanical contrivance described, it being dependent upon the relation of the several parts at the interval of the closing of the circuit and upon no electrical phenomena.

When a plurality of electroreceptive devices are employed, the operation as to each such device is substantially as heretofore described, the difference residing in the relative arrangement, disposition, and operation of the several elements. Thus in starting either brush *m n* may be rocked into contact with its tappet *k k'*, actuating the electroreceptive device, as described. The other tappet, being arranged at one hundred and eighty degrees, may be caused to energize the other device by a similar movement of the other brush toward or upon the completion of the half-cycle, thus imparting two impulses to the shaft during each cycle thereof and driving said shaft under constant power. The two brushes being insulated from each other and connected with the terminals of different solenoids, there are two independent circuits, each of which is closed or capable of being

closed at a period when its crank has passed the center, the other circuit being opened at this period to prevent a binding or locking of the engine. Either device may be used alone, the brushes *m n* being capable of independent movement.

The wiring described is such as makes the greater part of each circuit common to all, thus simplifying and cheapening the entire device.

If desired, the number of electroreceptive devices employed may be increased, it being merely necessary that each crank shall have a corresponding rotary contact actuated synchronously therewith and arranged so as to contact with its brush at a point when the crank is off the center.

It is not my intention to limit the invention to the precise details herein shown in the drawings, as it is apparent that such details may be varied to adapt the invention to various designs of toys and engines for various purposes and uses without departing from the spirit and scope of the invention.

Having described the invention, what I claim as new, and desire to have protected by Letters Patent, is—

1. In an electric toy, the combination of a metallic frame, a solenoid mounted thereon, a movable core mounted in said solenoid, a crank-shaft mounted on said frame and in electrical connection therewith, a connecting-rod the opposite ends of which are respectively pivotally connected to said core and said crank-shaft, a tappet carried by said crank-shaft and in electrical connection therewith, a brush mounted on said frame and insulated therefrom, and adapted to be engaged by said tappet, and suitable electrical connections whereby said frame, said shaft, said solenoid and said brush may be placed in circuit by the contact of said tappet with said brush.

2. In an electric toy, the combination of a metallic frame, a solenoid mounted thereon, a movable core mounted in said solenoid, a crank-shaft mounted on said frame and in electrical connection therewith, a connecting-rod the opposite ends of which are respectively pivotally connected to said core and said crank-shaft, a tappet carried by said crank-shaft and in electrical connection therewith, a brush comprising two diverging arms, a bearing whereby it may be pivotally mounted on said frame with said arms straddling said shaft, and means whereby said brush is insulated from said frame, and suitable electrical connections whereby said frame, said shaft, said solenoid and said brush may be placed in circuit by the contact of said tappings with said brush.

3. In an electric toy, the combination of a frame, a plurality of solenoids, a movable core mounted in each said solenoid, a crank-shaft mounted in said frame and in electrical



connection therewith, a plurality of connecting-rods the opposite ends of which respectively are pivotally connected to one of said solenoid-cores and a crank on said shaft, a  
5 plurality of tappets carried by said shaft and in electrical connection therewith, a plurality of brushes mounted on said frame and insulated therefrom and from each other, adapted respectively to be engaged by a tappet on  
10 said shaft, and suitable electrical connections whereby said shaft may be placed in circuit with said solenoids and said brushes alternately.

4. In an electric toy, the combination of a  
15 frame, a plurality of solenoids, a movable core mounted in each said solenoid, a crank-shaft mounted in said frame and in electrical connection therewith, a plurality of connecting-rods the opposite ends of which respectively are pivotally connected to one of said

solenoid cores and a crank on said shaft, a plurality of tappets carried by said shaft and in electrical connection therewith, a plurality of brushes, each said brush comprising two diverging arms, a bearing whereby it may be  
25 pivotally mounted with said arms straddling said shaft adjacent to one of said tappets, and means whereby each said brush is insulated from said shaft and from the other, and suitable electrical connections whereby said  
30 shaft may be placed in circuit with said solenoids and said brushes alternately.

In witness whereof I have hereunto affixed my signature, this 25th day of July, 1905, in the presence of two witnesses.

CHARLES G. MORTIMER, JR.

Witnesses:

F. T. WENTWORTH,  
HERBERT E. PLASS.