

(No Model.)

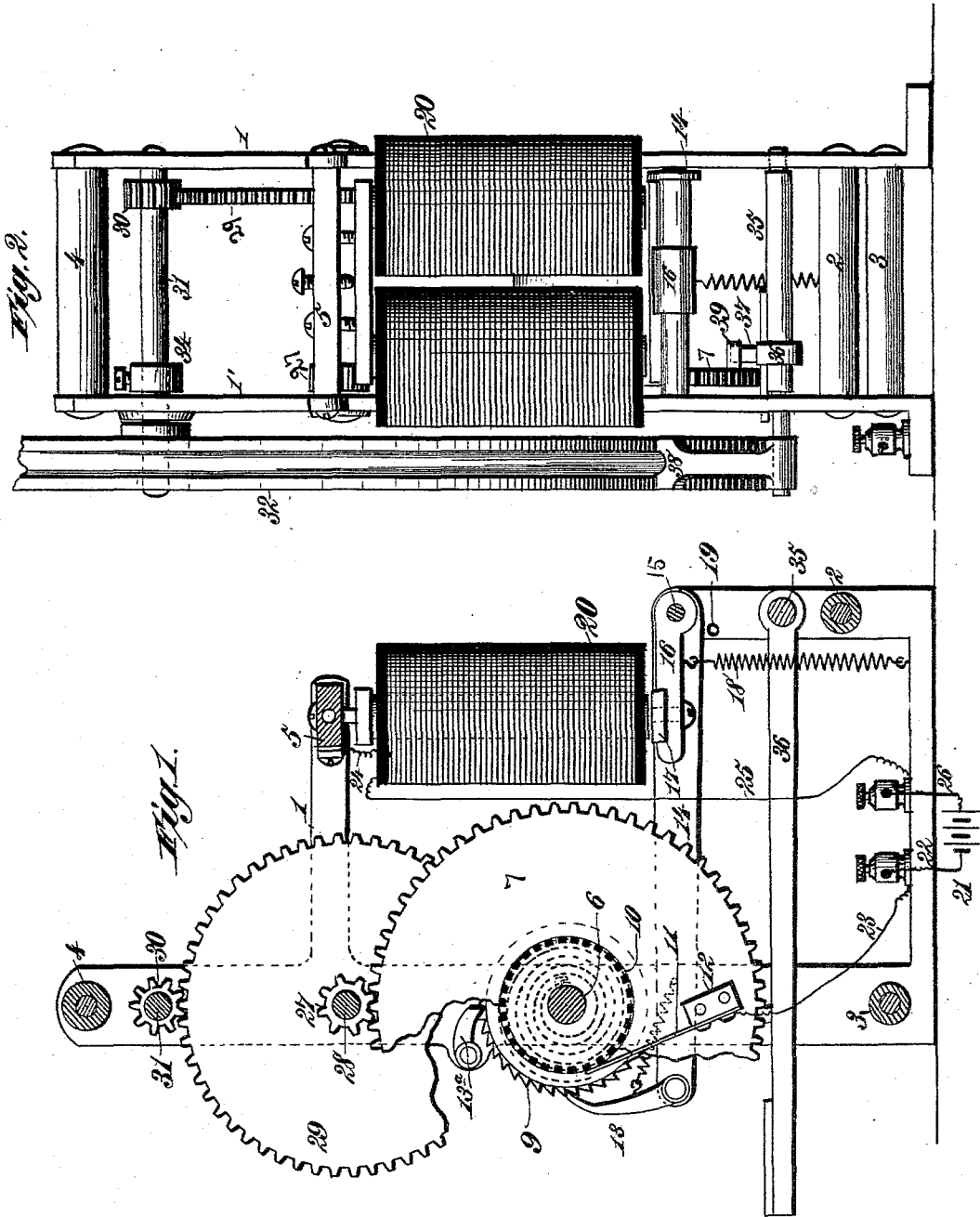
2 Sheets—Sheet 1.

C. A. RANDALL.

COMBINED MECHANICAL AND ELECTRO MAGNETIC MOTOR.

No. 401,207.

Patented Apr. 9, 1889.



Witnesses:
Robert Emmett,
Geo. W. Rea.

Inventor:
Charles A. Randall,
By *James B. Norris,*
Atty.

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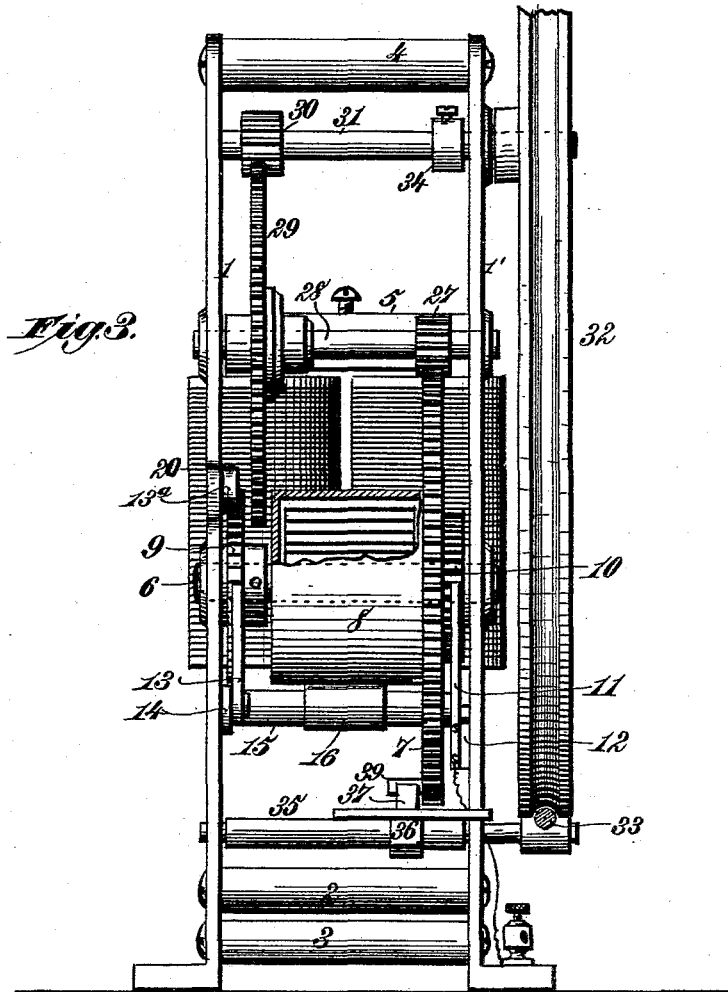


Fig. 3.

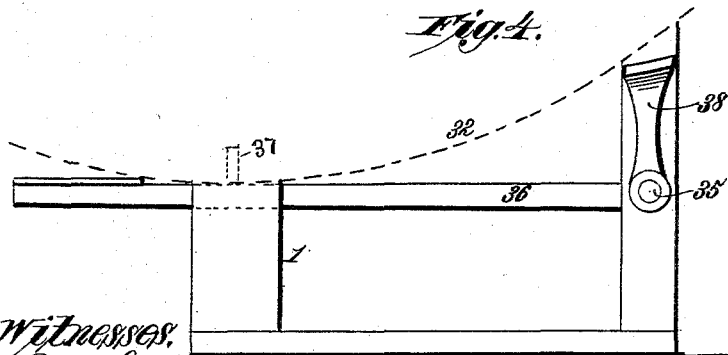


Fig. 4.

Witnesses:
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UNITED STATES PATENT OFFICE.

CHARLES ADAMS RANDALL, OF LONDON, ENGLAND.

COMBINED MECHANICAL AND ELECTRO-MAGNETIC MOTOR.

SPECIFICATION forming part of Letters Patent No. 401,207, dated April 9, 1889.

Application filed September 15, 1888. Serial No. 285,441. (No model.)

To all whom it may concern:

Be it known that I, CHARLES ADAMS RANDALL, a citizen of the United States, residing at London, in the Kingdom of Great Britain, have invented new and useful Improvements in Combined Mechanical and Electro-Magnetic Motors, of which the following is a specification.

This invention has for its objects to provide a novel mechanical electro-magnetic motor for driving lathes, dental drills, and other machines wherein the speed is controllable at the will of the attendant or operator, and to provide novel electro-magnetic mechanism for restoring at regular intervals of time the power that drives the motor-gearing. These objects I accomplish by the features of construction and organization of parts hereinafter described, and specified in the claims, reference being made to the accompanying drawings, in which—

Figure 1 is a sectional elevation of a portion of the motor; Fig. 2, a rear end elevation of the motor, showing the drive-wheel broken away; Fig. 3, a front end elevation showing the drive-wheel and the case or barrel of the motor-spring broken away; Fig. 4, a detail side elevation showing a governor for governing or controlling the speed of the motor.

In order to enable those skilled in the art to make and use my invention, I will now describe the same in detail, referring to the drawings, wherein the metallic supporting-frame is designated by the numerals 1 and 1', which frame is secured and held by lower brace-rods, 2 and 3, and upper brace-rods, 4 and 5.

The power-shaft 6 of the motor is journaled in the frame and carries a main gear-wheel, 7, and a case or barrel, 8, containing a spring for supplying the motive force, which spring is secured at one end to the winding-shaft and at the other end to the case or drum, and is arranged to be rewound in the direction of its unwinding. A rewinding ratchet-wheel, 9, is fixed on the winding-shaft 6, while the main gear-wheel 7 and spring case or drum 8 are loose on said shaft; but obviously this arrangement could be reversed.

A circuit-closing wheel, 10, located on the power-shaft 6, is rigidly fixed to the main gear-wheel 7, and this circuit-closing wheel is

provided with an annular series of make-and-break contact-points—the former composed of the exposed portions of the metal of the wheel and the latter of inserted pieces of rubber or other insulating material—the arrangement being such that there is an annular row of these points that alternate with each other, as is clearly represented in Fig. 1. To the part 1' of the frame is secured an insulating-block, 12, carrying a spring contact-finger, 11, that has its free end arranged to come alternately in contact with the annular series of make-and-break points of the circuit-closing wheel, so that the latter in its revolution alternately makes and breaks an electric circuit (hereinafter explained) any predetermined number of times in a revolution of the wheel, according to the number of make-and-break points provided on such wheel. A rewinding-pawl, 13, engages the ratchet-wheel 9, and is carried by one end of a vibratory lever or pawl-carrier, 14, mounted at its other end on a rock-shaft, 15, that carries a rigidly-attached armature-lever, 16, having an armature, 17. A spring, 18, serves to draw or move the armature-lever in one direction, which movement is limited by any suitable stop—such as a pin, 19—on the frame. An electro-magnet, 20, is adjustably suspended by screws from the brace-rod 5, so that the lower extremity of the core will be above and in proximity to the armature, said electro-magnet being in electric circuit with the circuit-closing wheel 10, which circuit is from a battery to terminal 21, conductor 23, spring contact-finger 11, wheel 10, supporting-frame, conductor 24, electro-magnet 20, conductor 25, terminal 26, back to the battery. The main gear-wheel 7 engages a pinion, 27, on a shaft, 28, carrying a large gear-wheel, 29, that engages a pinion, 30, on a shaft, 31, projecting outside the supporting-frame, and there provided with a balance drive-wheel, 32, adapted to connect by a belt, 33, with the machinery to be operated. The shaft 31 may be retained in proper position by the drive-wheel on the shaft outside the supporting-frame, and a collar, 34, on the shaft inside the frame.

A rock-shaft, 35, journaled in the frame carries an attached lever, 36, having an upwardly-

projecting pin, 37, to engage a lateral stud, 39, on the main gear-wheel 7, for the purpose of holding the motor when not in use at a point where the electric circuit is broken, the depression of said lever releasing the stud and permitting the motor to operate. The lever 36 may be moved by the hand or foot of the operator, and is adapted to operate a governor for governing or controlling the speed of the motor or stopping it at will. I exhibit this governor in the form of a brake-shoe, 38, on the rock-shaft arranged to act upon the balance drive-wheel 32 by the depression of the lever 36; but I do not confine myself to the exact form of governor shown, as some other kind of governor may be operated by the lever to vary, govern, or control the speed of the motor and its drive-wheel.

The device for supplying the motive power which I have shown is the spring 8; but this may be any equivalent contrivance, and it having been wound up to the proper tension and power to drive the motor and the machine to be operated thereby the motor is held ready for action by the pin 37 on the lever 36 engaging the stud 39 on the main gear-wheel. The electro-magnet, energized by a suitable battery, must be capable of exerting a power greater than the power of the driving-spring at its greatest necessary tension, in order that the magnet can rewind the spring to its maximum power at or before the time it reaches its minimum power, thus keeping it of proper tension to accomplish the work required, even at its minimum power.

The motor is started by depressing the lever to disengage its pin from the stud on the main gear-wheel, when the revolution of circuit-closing wheel 10 causes the electro-magnet to be vitalized by the electric current a number of times at each revolution of the circuit-closing wheel, and at each time the electro-magnet is vitalized it attracts the armature 17 with its armature-lever, thereby rocking shaft 15, raising the pawl-carrying lever 14, and causing the pawl 13 to advance the ratchet-wheel 9 one step, so that the spring in the case or barrel 8 is rewound all that it has unwound in the time between each closing of the circuit. The ratchet-wheel is held against back movement by a pawl, 13^a.

The invention is very useful for running light machinery—such as lathes, dental drills, sewing-machines, and similar contrivances—and for such purpose a balance drive-wheel outside the supporting-frame is important and essential.

I do not claim a self-winding device applicable to clocks or similar apparatus where constant and unvarying speed and power are desired, as proposed in Letters Patent No. 277,104, dated May 8, 1883, as such does not constitute my invention.

Having thus described my invention, what I claim is—

1. A motor for driving a lathe, drill, or other machine, consisting of a train of gearing having a drive-wheel to connect with and operate the lathe or other machine, a motive power for supplying the force to actuate the train of gearing, a ratchet-wheel for rewinding the motive power, a pawl-carrier having its pawl arranged to engage the ratchet-wheel, an electro-magnet, an armature-lever, an electric circuit, a revolving circuit-closing wheel having an annular row of alternating make-and-break contact-points, and a contact-finger in the circuit alternately acting on said annular row of alternating make-and-break contact-points to vitalize the electro-magnet at intervals, substantially as described.

2. A motor for driving a lathe, drill, or other machine, consisting of a train of wheels, one of which is provided with a lateral stud, a drive-wheel revolved by said train and having means to connect with and operate the lathe or other machine, a motive power for actuating the train of wheels, electro-magnetic mechanism, substantially as described, operating at intervals to rewind the motive power, a governor for controlling the speed of the drive-wheel, and a lever operating the governor and having a pin to engage and hold the aforesaid lateral stud, substantially as described.

3. A motor for driving a lathe, drill, or other machine, consisting of a train of gearing having a drive-wheel to connect with and operate the lathe or other machine, a motive power for actuating the train of gearing, an electric circuit, an electro-magnet in the circuit, pawl-and-ratchet mechanism, an armature-lever, a revolving circuit-closing wheel having an annular row of alternating make-and-break contact-points, and a contact-finger in the circuit acting alternately on said annular row of make-and-break points to vitalize the magnet at intervals and rewind the motive power the extent to which it unwound while the circuit was broken, substantially as described.

4. The combination, in a motor, of a train of gearing, a motive power for actuating the same, the ratchet-wheels, the pawl-carrier, the armature-lever, the electro-magnet, the circuit, the revolving circuit-closing wheel having an annular row of alternating make-and-break contact-points, and the contact-finger acting alternately on the said annular row of make-and-break points to energize the magnet at intervals and rewind the motive power, substantially as described.

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

CHARLES ADAMS RANDALL.

Witnesses:

WALTER J. SKERTEN,
CHAS. BERKLEY HARRIS.