(No Model.) 2 Sheets—Sheet 1.

J. F. McLAUGHLIN.

ELECTRO MECHANICAL MOVEMENT.

No. 379,802. Patented Mar. 20, 1888.

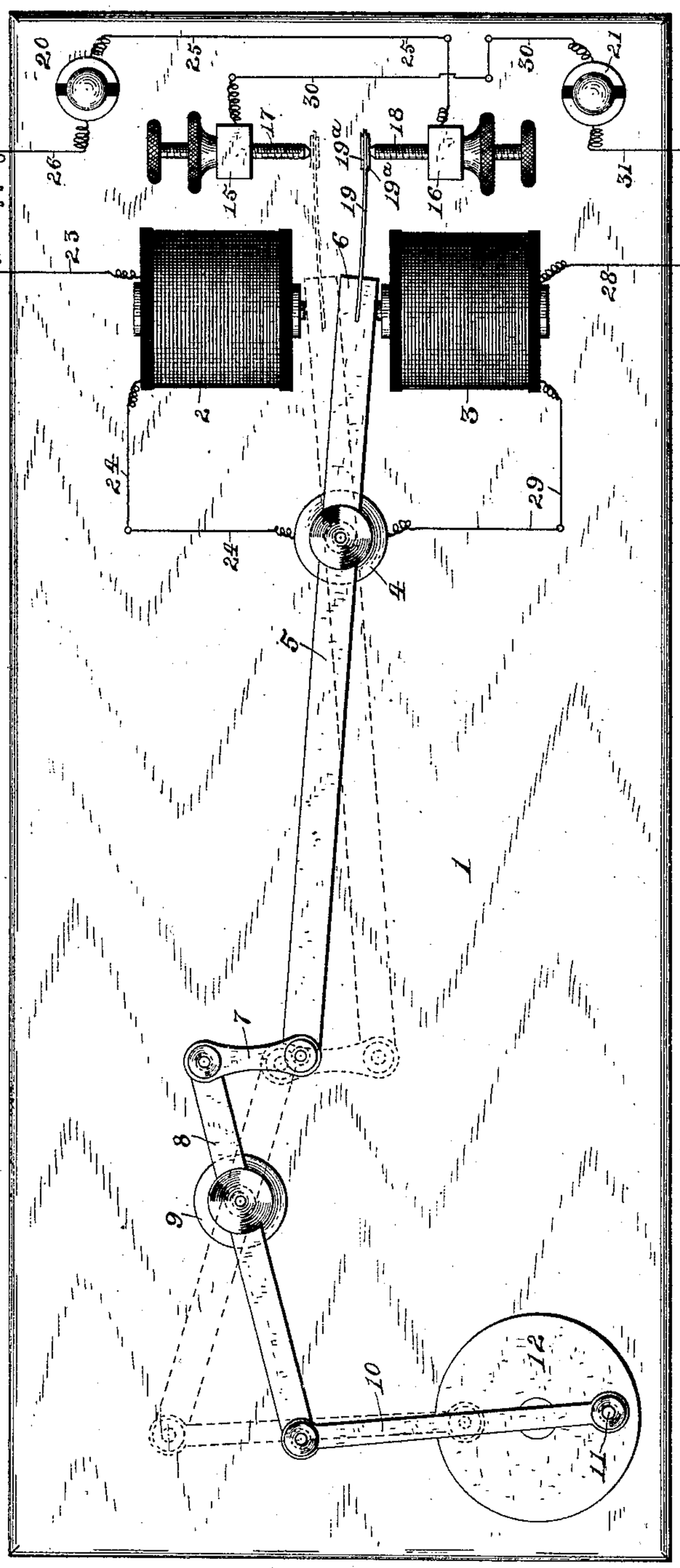

Fig. 1.

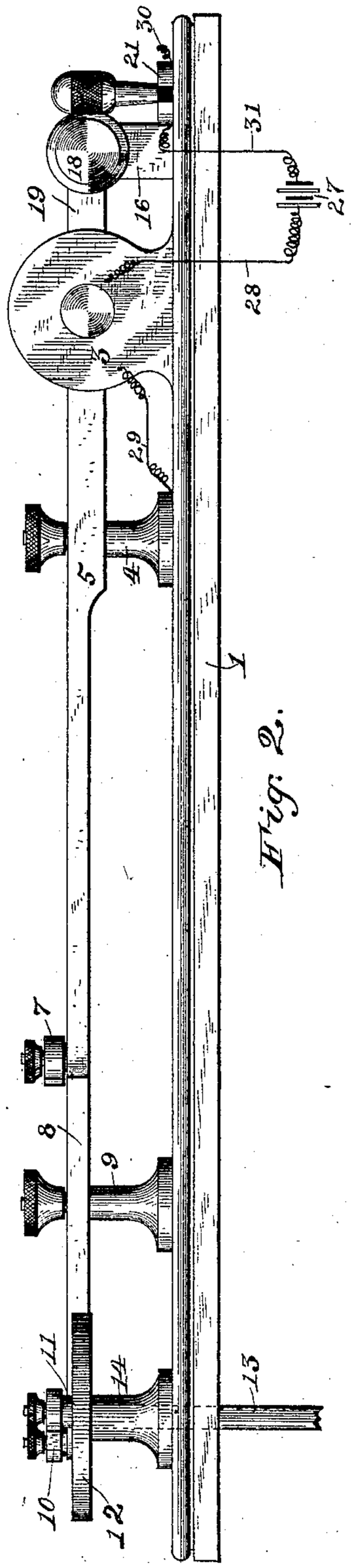

Fig. 2.

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(No Model.) 2 Sheets—Sheet 2.

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Fig. 3.

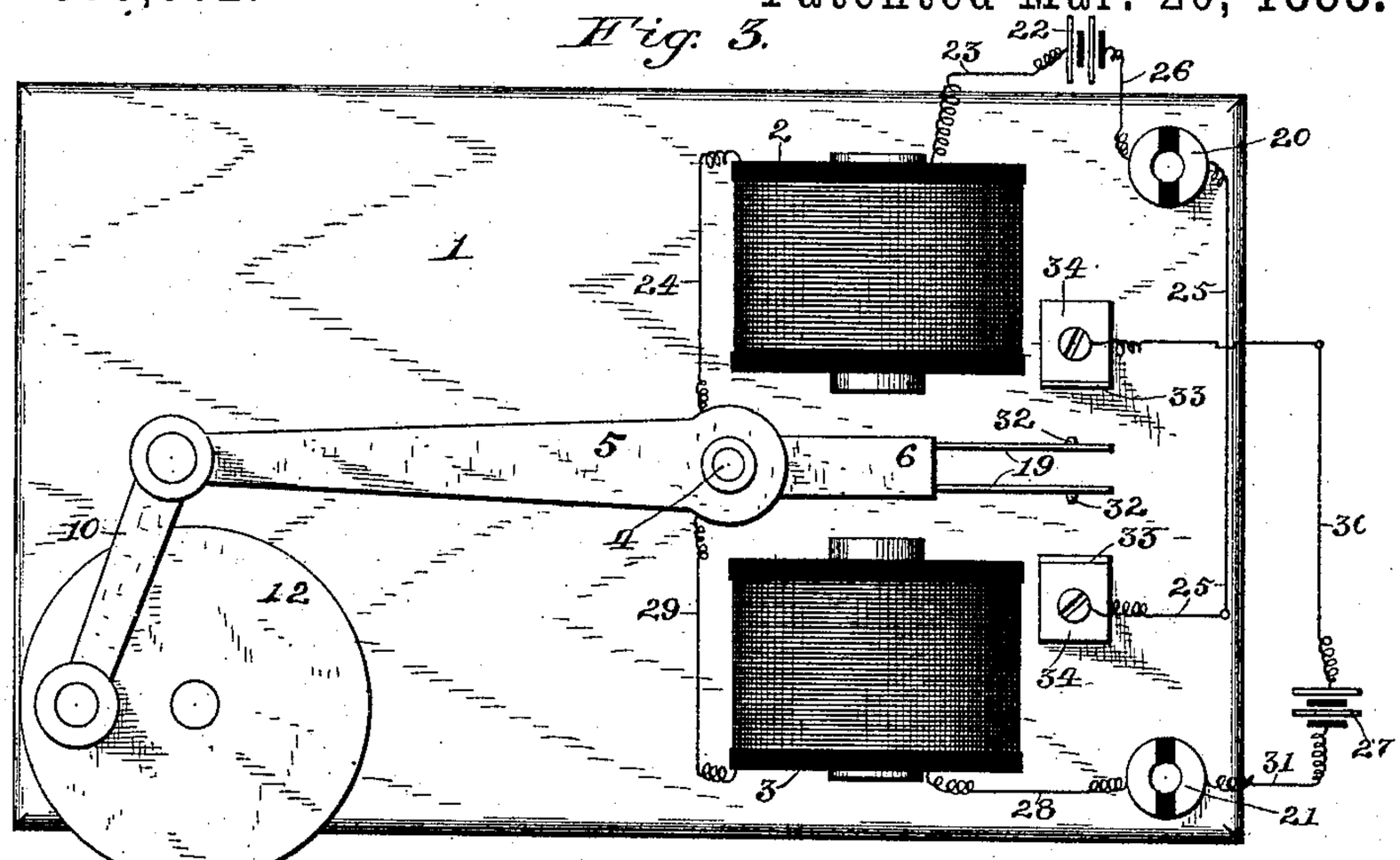
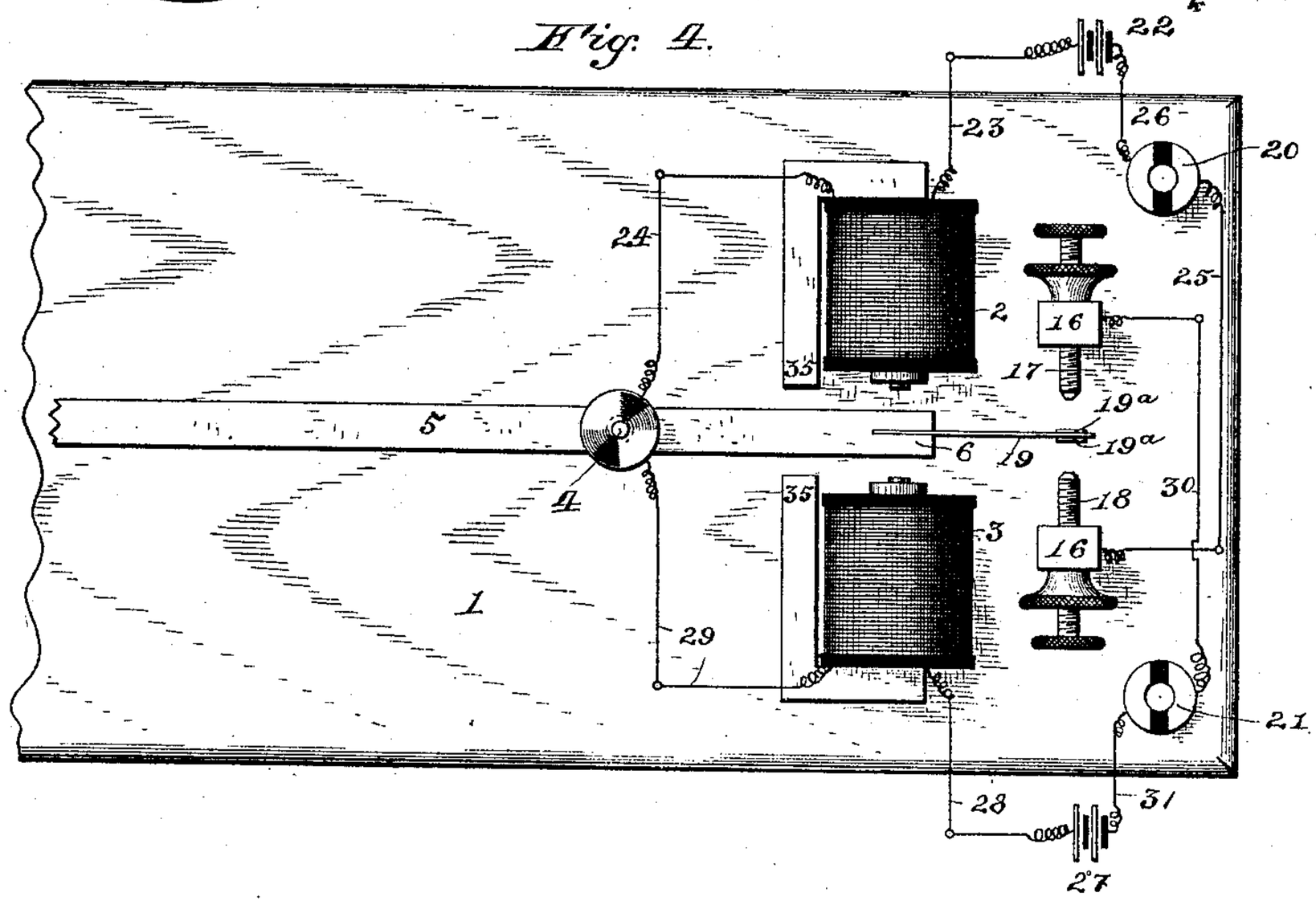


Fig. 4.



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UNITED STATES PATENT OFFICE.

JAMES F. McLAUGHLIN, OF PHILADELPHIA, PENNSYLVANIA.

ELECTRO-MECHANICAL MOVEMENT.

SPECIFICATION forming part of Letters Patent No. 379,802, dated March 20, 1888.

Application filed July 20, 1887. Serial No. 244,812. (No model.)

To all whom it may concern:

Be it known that I, JAMES F. McLAUGHLIN a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Electro-Mechanical Movements; and I do hereby 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.

My invention relates to new and improved electro-mechanical movements, and has for its object to utilize the attractive power of electro-magnets to impart a reciprocating or vibratory motion to a fulcrumed lever, which latter motion may be transmitted into a rotary or other movement, as may be desired.

With this end in view my invention consists in a certain organization of apparatus comprising details of construction, arrangements, and combinations of parts, which will be more fully described hereinafter, and the specific points of novelty in which will be designated in the appended claims.

Referring to the accompanying drawings, Figure 1 is a top plan view of my invention. Fig. 2 is a side elevation thereof. Fig. 3 is a top plan view of a modification in which two contact-springs are employed and the motion is imparted direct to the driving-shaft. Fig. 4 is a top plan view of a modification in which the magnet-cores are formed so as to present both poles to the armature.

Like numbers of reference indicate like or corresponding parts in the several figures of the drawings.

Referring to the drawings by the numbers, 1 designates a base-plate constructed of wood or other suitable material and rectangular in form, as shown. Secured upon the said base 1, near one end thereof, are two electro-magnets, 2 and 3, arranged in line with their poles adjacent to and at a predetermined distance from each other. Firmly attached to the base 1, near the said magnets, is a standard, 4, upon which is pivoted a metallic lever, 5, having its shorter end, 6, arranged to oscillate between the poles of the magnets 2 and 3, and adapted to be attracted thereby, when the latter are energized, by the passage of an electric current through their helices.

To the opposite end of the lever 5 is pivoted one end of a link, 7, the other extremity of which is pivoted to the shorter arms of a second lever, 8, supported and free to oscillate upon a standard, 9, secured to the base 1. A connecting-link, 10, is pivotally attached to the longer arm of the lever 8, and the opposite end of said connecting-link is pivoted on the crank-pin 11, projecting upwardly from the circular disk 12. Thus it will be seen that when the lever 5 is oscillated, as will be hereinafter described, its motion will be imparted by means of the link 7 to the lever 8, which will in its turn impart a reciprocating motion to the connecting-link 10, and thereby revolve the disk 12.

The driving-shaft 13 is firmly secured to the said circular disk 12 and passes downwardly therefrom through the hollow standard 14, and may be secured to a rotary valve or other mechanism to be operated thereby. Two metallic standards, 15 16, project upwardly from the wooden base 1, and have their upper ends horizontally perforated and screw-threaded to receive the adjustable conducting-screws 17 and 18.

A conducting-spring, 19, is secured at its inner end to the forward extremity, 6, of the lever 5, and the said spring is free to oscillate with the said lever and make contact alternately with the conducting-points of the screws 17 and 18. A thin platinum plate, 19^a, is secured upon each side of the end of the spring 19 at the point of contact with the conducting-screws 17 and 18, for the purpose of preventing fusion at the contact-points. Suitable cut-outs, 20 and 21, are employed for breaking and making the circuits, when desired.

The device is operated by two electric batteries, 22 and 27, with their respective circuits arranged as follows: Beginning with the battery 22, one pole of which is connected by means of the wire 23 with the helix of the magnet 2, which in turn is connected with the metallic standard 4 through the wire 24. The opposite pole of the said battery 22 is connected through the wire 26, cut-out 20, and wire 25 with the standard 16 and its conducting-screw 18. One pole of the battery 27 is connected through the wire 28 with the helix of the magnet 3, and then by means of wire 29 with the standard 4, and its opposite pole is

connected with the standard 15 and its conducting-screw 17 through the medium of the wire 31, cut-out 21, and the wire 30.

The metallic lever 5 being electrically connected with the standard 4, it will be seen that when its conducting-spring 19 is in contact with one of the conducting-screws—for instance, 18—the circuit from the battery 22 will be closed at that point, and the path of the electric current will be as follows: Starting from the battery 22, through the wire 23, magnet 2, wire 24, standard 4, lever 5, conducting-spring 19, screw 18, standard 16, wire 25, cut-out 20, and wire 26, back to the battery 22. On the other hand, should the spring 19 be in contact with screw 17, thereby closing the circuit from the battery 27, the path of the current will be in the following direction: Starting from the said battery 27, through the wire 28, magnet 3, wire 29, standard 4, lever 5, conducting-spring 19, screw 17, standard 15, wire 30, cut-out 21, and wire 31, back to the battery 27.

From the foregoing it will be understood that when the conducting-spring 19 is in contact with either of the conducting-screws 17 and 18 the electric circuit will be closed through the magnet on the opposite side of the device from the conducting-screw in contact with the said spring 19, energizing the said magnet to attract the end 6 of the lever 5.

The operation of my invention is as follows: First, we will assume that the conducting-spring 19 is in contact with one of the screws—say 18. Now, if the circuits be closed by the insertion of the plugs in the cut-outs the current will simultaneously pass through the magnet 2, energizing the same and causing it to attract the end 6 of the lever 5, which action will immediately draw the said end 6 toward the pole of the magnet 2, thereby operating the lever 8, the connecting link 10, and the disk 12, as hereinbefore described. By the time the spring 19 has broken contact with the screw 18 the several parts in motion will have attained sufficient momentum to carry them across the intervening space to the other extremity of their movement, as indicated by dotted lines in Fig. 1. Now, when the conducting-spring 19 comes in contact with the screw 17 in the latter position, the circuit will be closed through the magnet 3, energizing the same and causing it to attract the end 6 of the lever 5, thereby drawing it back to the first position and rotating the disk 12 through one revolution. The oscillations of the lever 5, and consequent revolutions of the disk 12 and shaft 13, will be very rapid, and this movement will be particularly useful where a high speed of revolution is required.

In Fig. 3 I have shown a modification of my invention, in which the magnets 2 and 3, the lever 5, and the circuits are arranged substantially the same as in the foregoing description, the difference being that in the latter instance I employ two contact-springs, 19 19, provided with the points 32 32, adapted to make contact with the platinum plates 33 33, secured upon the metallic standards 34 34; and, further, I connect the link 10 directly with the lever 5, and thus obtain a more simple and direct movement.

In Fig. 4 I have shown one of the poles 35 35 of each magnet extended, and brought up outside of the helices parallel with the cores thereof, in proximity to the end 6 of the lever 5, for the purpose of augmenting the force of the attraction by presenting both poles of each magnet to the end 6 of said lever 5.

Having thus fully described my invention, what I claim, and desire to secure by Letters Patent of the United States, is—

1. The combination, with two poles of electro-magnets arranged opposite to each other, as shown, of a pivoted metallic lever having one end passing between said poles, contact-points arranged in the same plane as the faces of their respective poles, and the independent circuits respectively connected with the lever and with a contact-point, and plug cut-outs for electrically disconnecting the circuit to either or both contact-points, as specified.

2. The combination, with two independent electric circuits, each including a contact-point, an electro magnet or magnets, a source of electricity, and a terminal common to both circuits, of a conducting armature-lever, electrically connected with said common terminal, pivoted so as to vibrate between poles of opposite polarity of said electro-magnets, and so arranged as to make or break each circuit by engagement with said contact-points, and suitable mechanism connected with said armature-lever by a system of levers, and arranged to be operated by the vibratory movement of the said armature-lever.

3. The combination, with two independent electric circuits, each including a contact-point, an electro magnet or magnets, a separate source of electricity, and a terminal common to both circuits, of a conducting armature-lever electrically connected with said common terminal, pivoted so as to vibrate between poles of opposite polarity of said electro-magnets, and so arranged as to make and break each circuit by engagement with said contact-points, respectively, at the extremities of its oscillations, substantially as described.

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

JAMES F. McLAUGHLIN.

Witnesses:

C. B. WALLER,

E. T. WHITE.