

(No Model.)

C. J. VAN DEPOELE.  
RECIPROCATING ELECTRIC ENGINE.

No. 467,451.

Patented Jan. 19, 1892.

Fig. 1.

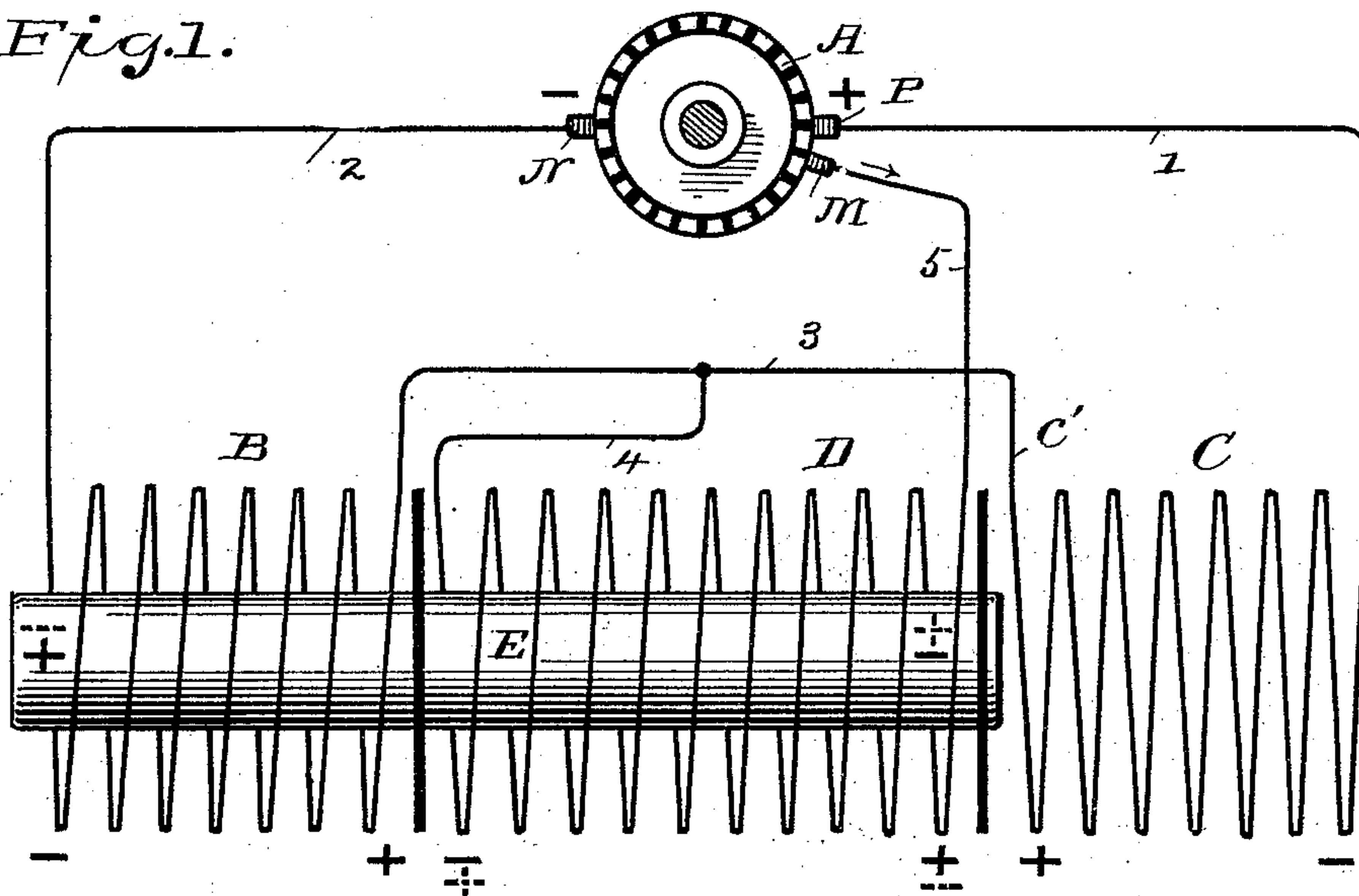
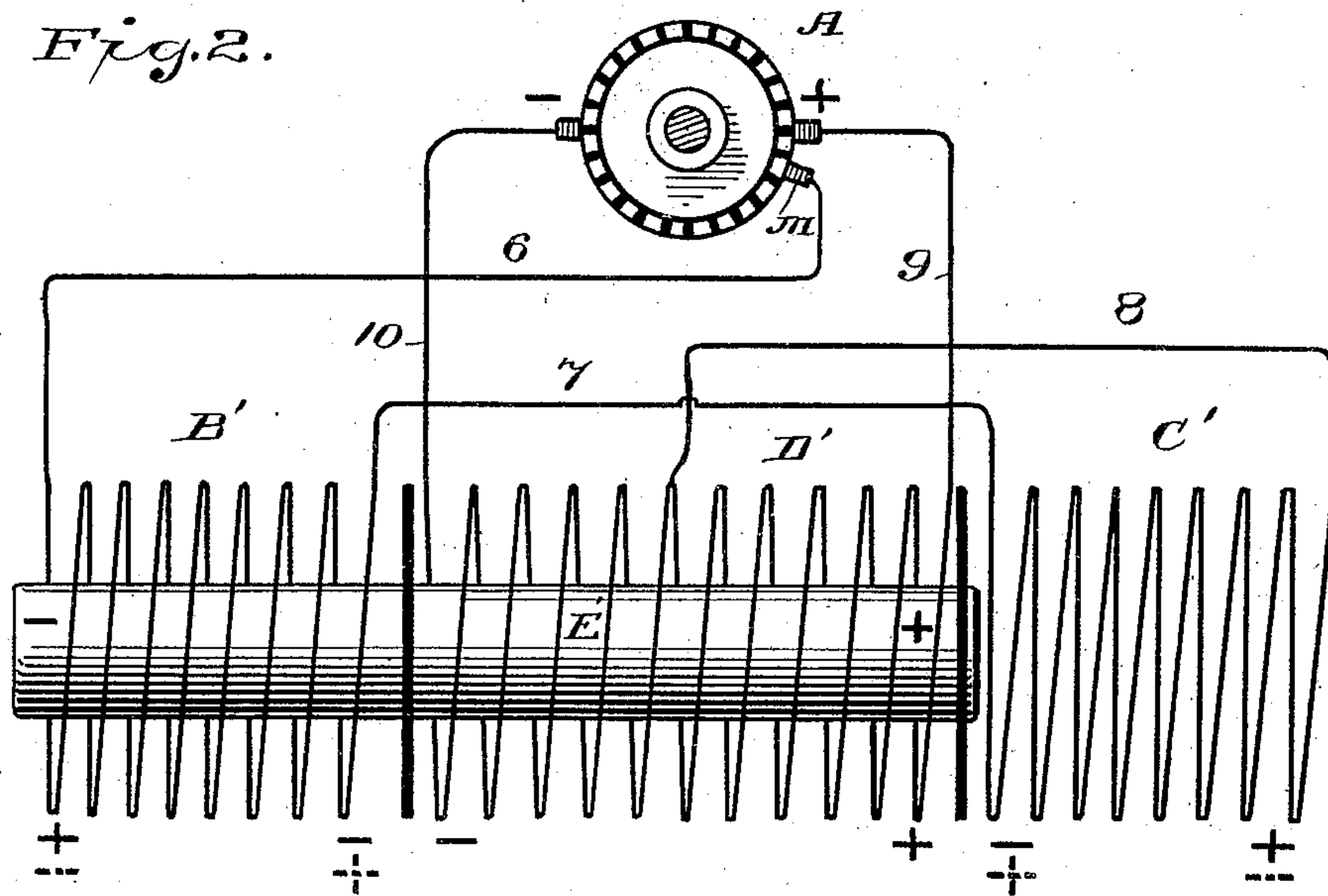


Fig. 2.



Witnesses

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# UNITED STATES PATENT OFFICE.

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## RECIPROCATING ELECTRIC ENGINE.

SPECIFICATION forming part of Letters Patent No. 467,451, dated January 19, 1892.

Application filed July 10, 1891. Serial No. 399,088. (No model.)

*To all whom it may concern:*

Be it known that I, CHARLES J. VAN DEPOELE, a citizen of the United States, residing at Lynn, in the county of Essex and State of Massachusetts, have invented certain new and useful Improvements in Reciprocating Electric Engines, of which the following is a description, reference being had to the accompanying drawings, and to the letters and figures of reference marked thereon.

My invention relates to improvements in electro-magnetic reciprocating engines of the general type referred to in a number of patents already granted to me, and it comprises a plurality of motor-coils and a magnetic piston adapted to be reciprocated under the influence of a shifting or changing field of force. In the present instance a source of current is employed which resembles in all material respects that shown and described in my patent, No. 422,855, March 4, 1890—that is to say, a circuit extending between the two main stationary commutator-brushes of a continuous-current machine and another circuit supplied by a brush moving upon said commutator between the stationary brushes, the changes in polarity caused by such action being caused by a suitable arrangement of coils and connections to produce opposite magnetic effects upon the piston and consequent reciprocation of the magnetic plunger within said coils.

In the drawings, Figure 1 is a diagrammatic view of a reciprocating engine embodying the invention. Fig. 2 is also a diagrammatic view showing a somewhat different but equivalent arrangement of the motor-coils.

Referring to Fig. 1, A is a sectional commutator of the continuous-current type of machine, whether generator or counter-electro-motive force device. P N are respectively the main stationary positive and negative commutator-brushes suitably sustained in operative relation to said commutator. M is a third brush, which is movably sustained with respect to the commutator and arranged to be oscillated upon or rotated about said commutator toward and away from stationary brushes in any suitable manner—for instance, as pointed out in my said prior patent. B C are motor-coils arranged in line with each other, and D is a third motor-coil placed be-

tween the coils B C, the entire length of the three coils forming a continuous opening, within which a magnetic plunger E is free to move. The coils B C are in series with each other, and their terminals are connected by wires 1 2 with the brushes P N, their inner terminals being joined by conductor 3. The flow of current in the coils B C will therefore be continuous and constant so long as such current is supplied. One terminal of the coil D is connected by conductor 4 with conductor 3, while its other extremity is attached to the moving brush M by conductor 5, which places said coil D in derivation from the main circuit, which includes coils B and C. As the brush M travels about the commutator A the current will flow first in one direction and then in the other in the coil D for the reason that when the brush M is near one of the stationary brushes the current will flow through it and through the coil D, and back to the machine through one of the main coils, and when said brush is in an opposite position the reverse action will take place. As indicated in Fig. 1, current will flow outward through the brush M into and through the coil D, thence by conductor 4 to conductor 3, and back to the commutator through coil B, conductor 2, and the negative commutator-brush. The plunger E never entirely leaves the coil D, and consequently said plunger is magnetized thereby, and the polarities of said plunger will be alternated in accordance with the shifting of direction of the current in the coil D, due to the rotation of the brush M, and said plunger will necessarily be attracted first in one direction and then in the other by the coils B and C, in accordance with its own changes of polarity. Therefore by regulating or controlling the speed of the movement of the brush M, the rate of reciprocation will be determined. The plunger E should be made of laminated or otherwise subdivided iron, but it may of course be only slitted, or a solid plunger may be used, if desired.

It will be readily understood that the foregoing instrumentalities may be differently arranged. For example, see Fig. 2, in which the connections of coils, practically the same as the coils of Fig. 1, have been changed, as may



be desirable in some cases, to produce substantially the same results but differing, perhaps, in some element of convenience or adaptability to the particular circumstances.

5 In Fig. 2 coils B' C' are supplied with current from the moving brush M, said coils being connected therewith and in series by conductors 6, 7, and 8. The central coil D' has its terminals connected with the main commutator-brush by conductors 9 and 10, so that  
10 the current flows continuously and always in the same direction through the central coil D', which therefore establishes and maintains constant poles in the plunger E', which said  
15 poles are reacted upon by the alternating-current end coils B' C'. The current in said coils not only alternates in direction but has a constant rise and fall depending in frequency upon the movement of the brush M. The terminal of conductor 8 is connected at the center of coil D', either half of which serves as a return conductor to the current passing through the coils B' C', according to the position of the brush M and the constant direction of said current. The relative sizes of the  
25 conductors to be employed in the various motor-coils referred to, as well as various other details of construction, are matters which relate more to the particular use to which the invention is to be put than to the principles of the invention, and will therefore be adjusted or arranged as may be found most desirable in each particular instance.

30 Instead of a moving commutator-brush M, I may, of course, employ a collector-ring connected to one of the segments of the commutator, together with a collector bearing upon the ring. The difference between these, however, and the form herein shown is that where  
40 a separate brush is used its rate of movement may be entirely controlled, whereas with the ring connected with a section of the commutator absolute synchronism is necessary.

45 Various modifications may be made in the above-described invention without departing from the spirit or scope thereof.

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

1. A reciprocating electric engine comprising a motor coil or coils in circuit with the terminals of a source of continuous current, in combination with a coil or coils connected alternately in derivation from the continuous-current coils, and means for supplying the shunt coil or coils with current having a defined rise and fall and of alternating character, and a magnetic plunger adapted to be reciprocated within said coils under their combined influence. 50 60

2. In an electro-magnetic reciprocating engine, the combination of a sectional commutator having positive and negative stationary brushes, a motor coil or coils connected with said brushes and energized continuously therefrom, a motor coil or coils connected in derivation alternately with either of the continuous-current coils, an auxiliary moving brush upon the commutator, connections between the said brush and the shunt coil or coils, whereby current is caused to rise and fall in and to flow in continuously-reversed direction in said shunt coil or coils, and a magnetic plunger placed under the influence of all the coils. 65 70 75

3. A reciprocating engine having a motor coil or coils, the terminals of which are connected to the main positive and negative commutator-brushes of a constant-current supply, a coil or coils one terminal of which is connected in the circuit of the coils between the main commutator-brushes, its other terminal being connected to a brush moving upon the commutator of the constant-current supply, and an iron plunger reciprocating under the influence of all the coils. 80 85

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

CHARLES J. VAN DEPOELE.

Witnesses:

JOHN W. GIBBONEY,  
CHARLES E. MANN.