

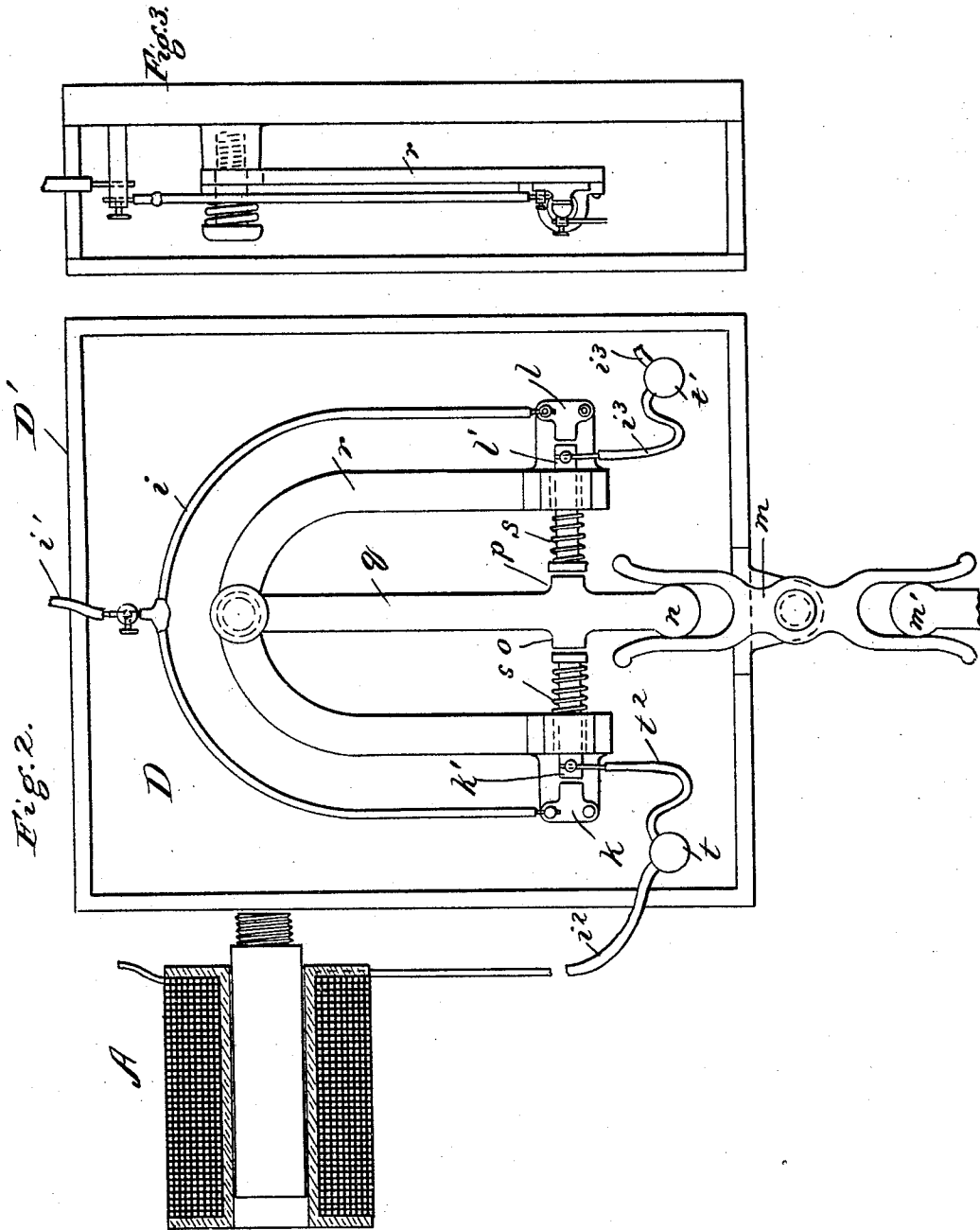
(No Model.)

2 Sheets—Sheet 2.

I. T. DYER.
ELECTRIC ENGINE.

No. 573,581.

Patented Dec. 22, 1896.



Witnesses:
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UNITED STATES PATENT OFFICE.

ISAAC T. DYER, OF CHICAGO, ILLINOIS, ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, TO THE DYER POWER COMPANY, OF SAME PLACE.

ELECTRIC ENGINE.

SPECIFICATION forming part of Letters Patent No. 573,581, dated December 22, 1896.

Application filed March 30, 1896. Serial No. 585,390. (No model.)

To all whom it may concern:

Be it known that I, ISAAC T. DYER, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have
5 invented a new and useful Improvement in Electric Engines, of which the following is a specification.

The object of my invention is to provide a novel construction of electric motor for driving an engine, for use in its purpose either
10 alone or supplemental to the steam or other motive power employed.

My improved motor involves in its construction, as the essential parts, a pair of solenoid-magnets having reciprocating cores connected
15 with a suitably-fulcrumed lever which is operatively connected with the engine to drive it by the oscillatory movements of the lever produced by the longitudinal reciprocation of the
20 solenoid-cores under the control of an automatic switch having a shifting-lever connection with the cut-off valve of the engine, and which turns the current from an electric generator into the magnets alternately.

My improvement may be operatively applied to engines generally, but for the sake of convenience I elect to describe its construction and mode of operation more particularly in connection with a locomotive-
30 engine, and therefore so illustrate it in the accompanying drawings, in which—

Figure 1 is a view in side elevation of a locomotive-engine equipped with my improvement; Fig. 2, an enlarged broken view, in front
35 elevation, of the switch device, showing one of the magnets connected therewith; and Fig. 3 shows the switch device by a view in side elevation.

A and A' are two solenoid-magnets having
40 their cores B connected with a lever C at one side of its fulcrum, the lever being connected at the opposite side of its fulcrum with the driver of the engine to be driven.

D is the switch device, the preferred construction of which is that illustrated as comprising an inverted-U-shaped yoke *r*, supported in a box D' and having pendulously
45 suspended from its upper end a lever *g*, provided with lateral projections *p* and *o* near its
50 lower end, at which it terminates in a head *n*, embraced by one bifurcated end of a lever

m, fulcrumed between its extremities, and the opposite end of which is similarly bifurcated to engage the head of a shifting-lever
55 *m'*. In the ends of the yoke *r*, and in alignment with the projections *p* and *o*, are supported, to be moved lengthwise with relation to stationary contacts *l* and *k*, the contacts *l'* and *k'*, each of which is spring-controlled, as
60 by confining about it a spring *s* between its head and the adjacent yoke-arm. The contacts *k* and *l* are connected by an insulated conductor *i*, with which one pole of a generator (such as a dynamo-electric machine, indicated at E) is connected through the medium
65 of a conductor *i'*. The contact *k'* is connected by an insulated conductor *i''*, which leads through a binding-post *t*, with one end of the magnet A, the other end of which may lead back to the opposite pole of the generator,
70 and the contact *l'* is similarly connected by an insulated conductor *i'''*, which leads through a binding-post *t'*, with one end of the magnet A', the other end of which may lead back to the opposite pole of the generator.
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When the lever *g* is swung to bear with its projection *o* against the contact *k'* and force it against the contact *k*, the circuit containing the magnet A is closed over the wires *i* and *i'*, while the circuit containing the magnet A' is broken at the separated contacts *l'* and *l*. Thus the magnet A is energized and the magnet A' is deenergized, causing the former to suck its core B in one direction, thereby turning the lever C to actuate the
80 driver of the engine accordingly. When the lever C has completed its stroke in the one direction, the shifting-lever *m'* will have been turned on its fulcrum to turn the lever *m* in the direction to swing the lever *g* at its projection *r* against the contact *l'*, thereby releasing the contact *k'* and permitting it to be retracted by the recoil of its spring *s* to break the circuit containing the magnet A, thus deenergizing the latter and forcing the contact *l'* against the contact *l* to close the circuit containing the magnet A', which is thus energized to suck its core B in the opposite
85 direction, with the effect of swinging the lever C in the direction to complete the revolution of the driver and of turning the shifting-lever *m'* to swing the lever *m* in the di-
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rection to return the lever *q* at its projection *o* against the contact *h'* and thereby again produce closure of the circuit containing the magnet *A* in the manner already described.

5 In the same way the lever *q* will be pendulously swung continuously, to alternately open and close the circuit containing each magnet of the solenoid device, with the effect of longitudinally reciprocating the cores
10 *B* and rocking the lever *C* to work the driver of the engine.

When my improvement is applied to a locomotive-engine *F*, it may be used upon the latter without in any way altering or impairing the construction of the engine, and may
15 form, as shown, a supplemental motive power to the steam. In this application of my improvement two sets of the solenoid-magnets and their described connections with a generator should be provided, each set being
20 supported as shown of the one set in Fig. 1, namely, with the magnets *A* and *A'* on supports *h* and *h'*, (which should be covered to protect the magnets, though to display them
25 the covers are omitted,) secured to the side of the boiler, with the automatic switch device in its box *D'* also secured to the side of the boiler and having the pendent lever *m* embracing at its lower bifurcated end the
30 head of the upper end of the lever *m'*, which is fulcrumed at *x* between its ends and engages at its lower end the ordinary rocking-head or shifting-link device *g* on a locomotive-engine, while the lever *m'* is connected from
35 its upper end with some driven part of the engine, as the rod *f* of the slide-valve, (not shown,) which controls, in the usual manner, the supply of steam from the steam-chest *G* to opposite sides of the piston in
40 the cylinder *G'*. Then, as will be seen, the reciprocating motion of the rod *f* effects the rocking of the lever *m'* to rock the lever *m* and swing the switch-lever *q*. Moreover, on the locomotive-engine the lever *C* of each
45 set of my improved electric mechanism is fulcrumed to a bearing *d* on the side of the boiler to engage at its upper slotted end a coupling *c*, (which may be of brass or insulating material,) connecting the two solenoid-
50 cores *B*, which screw into the coupling, and to engage at its lower slotted end the cross-head *b*, connected in the usual manner with the drivers of the engine. The generator may be a dynamo (indicated at *E*) supported on
55 the tender *F'*, as shown, and driven by a steam-engine, (indicated at *H*), to which steam is supplied from the dome *I* of the boiler, or it may be a set of storage batteries (indicated at *E'*) and suitably connected in the circuits
60 containing the solenoid-magnets and switch devices *D*, or the current may be taken in the ordinary manner from an overhead live wire (indicated at *E²*) or underground wire through the medium of a trolley, (indicated
65 at *E³*.)

In the application of my improvement to any engine it should include in the line *i'*,

leading from the generator to the switch *D*, a cut-out switch *K*, of ordinary or any suitable construction, and a graduating-switch
70 device *L*, which may be like that commonly employed on trolley-cars.

What I claim as new, and desire to secure by Letters Patent, is—

1. An electric motor comprising, in combination with an electric generator, a pair of solenoid-magnets and their cores coupled end-
75 wise together, a lever connected with said cores to be oscillated by their reciprocating movement and adapted to be connected with
80 the driver of an engine, and a switch device having a pair of stationary contacts in the generator-circuit and a pair of spring-controlled movable contacts adjacent to said station-
85 ary contacts and respectively connected, electrically, with said magnets, a pendulously-supported lever extending between said movable contacts, and shifting-lever mechanism
90 engaging said pendulous lever, substantially as and for the purpose set forth.

2. An electric motor comprising, in combination with an electric generator, a pair of solenoid-magnets and their cores coupled end-
95 wise together, a lever connected with said cores to be oscillated by their reciprocating movement and adapted to be connected with the driver of an engine, and a switch device
100 comprising a frame carrying a pair of stationary contacts in the generator-circuit and a pair of spring-controlled movable contacts adjacent to said stationary contacts and res-
105 pectively connected, electrically, with said magnets, a lever pendulously supported on said frame to extend toward its free end between said movable contacts, a lever *m* ful-
110 crumed between its ends and engaging at one end the lower end of the pendulous lever, and a lever *m'* engaging with the opposite end of said lever *m*, substantially as and for the purpose set forth.

3. In combination with an engine, a pair of solenoid-magnets *A* and *A'* having the cores
115 *B* coupled endwise together, a lever *C* fulcrumed to engage at one end the coupling of said cores and at its opposite end a driving part of the engine, an electric generator, and
120 a switch device contained with the said magnets in the circuit of said generator and having a shifting-lever connection with the cut-off valve of the engine, substantially as and for the purpose set forth.

4. In combination with an engine, a pair of solenoid-magnets *A* and *A'* having the cores *B*
125 coupled endwise together, a lever *C* fulcrumed to engage at one end the coupling of said cores and at its opposite end a driving part of the engine, an electric generator, and a switch device having a pair of stationary
130 contacts, *l*, *k* in the generator-circuit and a pair of spring-controlled movable contacts *l'*, *k'*, adjacent to said stationary contacts and respectively connected, electrically, with said magnets, a pendulously-supported lever *q* extending between said movable contacts, and

shifting-lever mechanism connecting said pendulous lever with the cut-off valve of the engine, substantially as and for the purpose set forth.

- 5 5. In combination with an engine, a pair of solenoid-magnets A and A' having the cores B connected end to end by a coupling c , a lever C fulcrumed between its ends on a bearing d and engaging at one end the cores at
10 said coupling and at its opposite end a driving part of the engine, an electric generator, and a switch device D having its mechanism inclosed in a box D' and comprising the frame
15 r provided at its ends with stationary contacts l, k in the generator-circuit and a pair of spring-controlled movable contacts l', k' adjacent to said stationary contacts and con-

nected, respectively by wires i^3, i^3 , with the magnets A' and A , a lever q pendulously supported in said frame and having lateral projections p and o respectively adjacent to the contacts l' and k' , and a head n at its lower end, a lever m bifurcated at its opposite ends between which it is fulcrumed between its ends to engage at one end said head n , and a
25 lever m' fulcrumed between its ends to engage at one end the adjacent end of the lever m and connected with the cut-off valve of the engine, substantially as and for the purpose set forth.

ISAAC T. DYER.

In presence of--

J. H. LEE,

R. T. SPENCER.