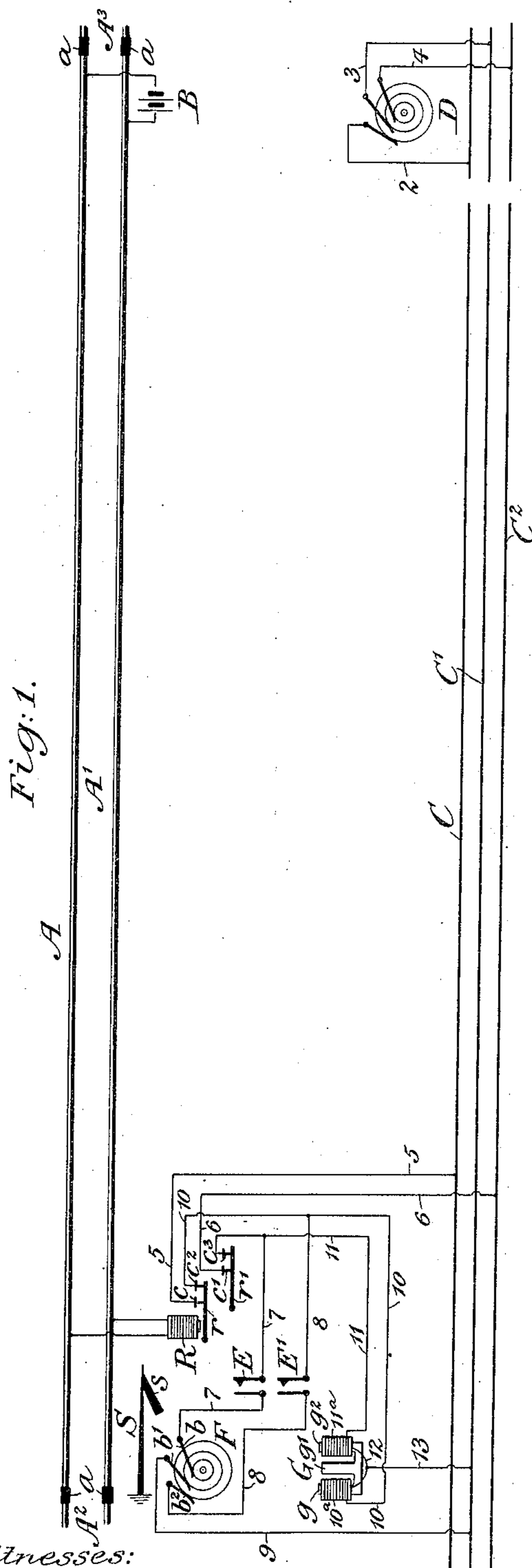


No. 821,767.

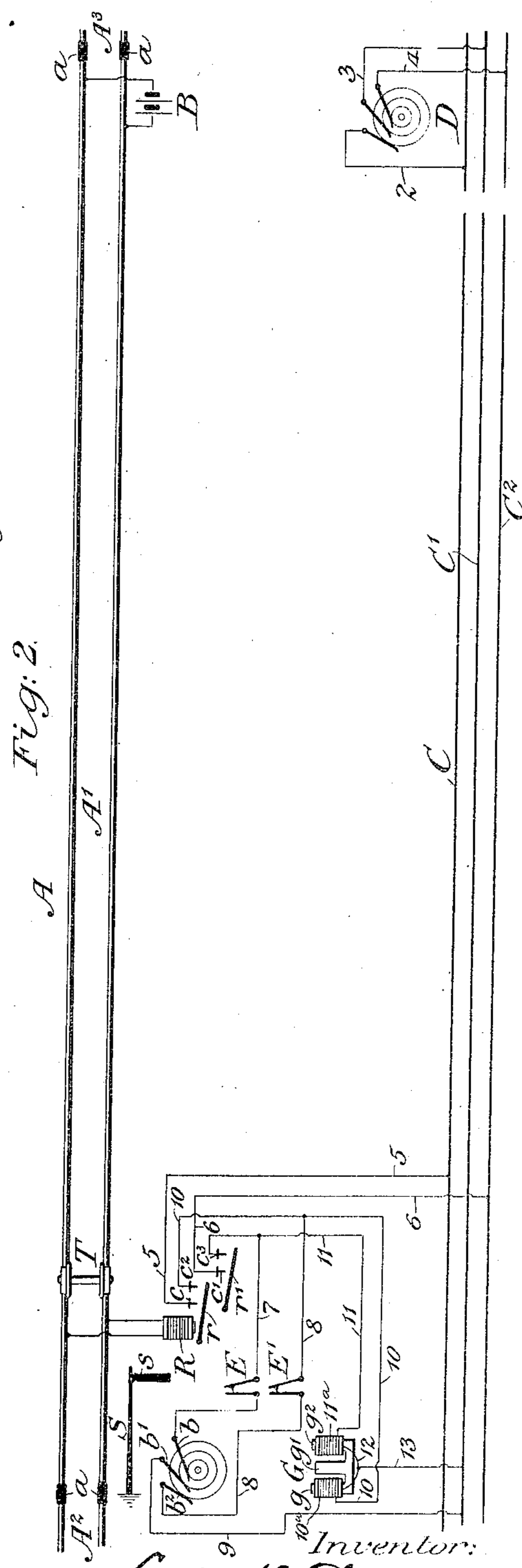
PATENTED MAY 29, 1906.

L. H. THULLEN.
RAILWAY SIGNALING SYSTEM.

APPLICATION FILED JAN. 12, 1906.



Witnesses:
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UNITED STATES PATENT OFFICE.

LOUIS H. THULLEN, OF EDGEWOOD PARK, PENNSYLVANIA, ASSIGNOR TO
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RAILWAY SIGNALING SYSTEM.

No. 821,767.

Specification of Letters Patent.

Patented May 29, 1906.

Application filed January 12, 1906. Serial No. 295,695.

To all whom it may concern:

Be it known that I, LOUIS H. THULLEN, a citizen of the United States, residing at Edgewood Park, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Railway Signaling Systems, of which the following is a specification.

My invention relates to railway block-sig-
naling systems wherein alternating current is
employed to operate alternating-current mo-
tors, magnets, and other electromagnetic de-
vices employed in the system for moving the
signal devices of railway-signals, the trip-
arms of train-stop mechanisms, &c. I pref-
erably employ a multiphase current and mul-
tiphase motors or other electromagnetic de-
vices responsive thereto. By the use of a
motor operated by multiphase currents I
avoid the use of a commutator, which is more
or less objectionable, although necessary when
a direct-current motor is employed. Multi-
phase motors also have the advantage over
single-phase motors in that they are more
efficient and are less expensive in construc-
tion. An electromagnetic device—for ex-
ample, a magnet—gives better results and
can be used more advantageously when en-
ergized by a multiphase current than a simi-
lar electromagnetic device operated by a con-
tinuous or direct current or a single-phase al-
ternating current, as the magnetism in its
core never reaches zero at any instant, as is
the case in single-phase magnets, for the ob-
vious reason that when one phase of the mag-
net is at its zero-point the next phase is more
or less remote therefrom. In other words, if,
for example, a two-phase alternating-current
magnet is employed, and I prefer to employ
such a magnet, the two phases of like current
will be impressed in proper sequence upon the
magnet, and while one phase is passing the
zero-point the second phase is an appreciable
quantity above zero.

I will describe a railway signaling system
embodying my invention and then point out
the novel features thereof in claims.

In the accompanying drawings, Figure 1 is
a diagrammatic view of a railway signaling
system embodying my invention. In this
view the circuits are in their normal or closed
condition and the signal-arm moved to a po-
sition indicating "safety." Fig. 2 is a view
similar to Fig. 1; but the circuits are therein

shown in their abnormal or open condition, 55
due to the presence of a train in the block-
section shown, the signal-arm in this instance
being moved to a position indicating "dan-
ger." The train is herein represented by a
pair of wheels and axle. 60

Similar reference characters designate cor-
responding parts in both figures of the draw-
ings.

I have only illustrated my invention in
connection with a railway signal mechanism. 65
I do not wish to be limited to this, as it is ap-
parent that motors and magnets constructed
and energized in the manner herein stated
may be used to operate switches, train-stops,
and other parts or appliances which in any 70
way control or govern the passage of cars or
trains along a railway.

A designates a portion of a railway-track,
which may be divided in the usual manner
into a number of block-sections by means of 75
insulations *a*. I have shown one complete
section *A'* and portions of two adjacent sec-
tions *A²* and *A³*, respectively. Each block-
section is provided with a track-battery *B*
and relay *R*, which, with the two rails, com- 80
plete the track-circuit, and which track-cir-
cuit controls the operation of the signal, au-
tomatic stop, &c., in the usual manner and
well understood in the art.

C C' C² designate the mains which are fed 85
from a multiphase generator *D*, conveniently
located at some supply or power house. I
have shown a two-phase-current generator,
the brushes of which connect with the mains
C C' C² by wires 2, 3, and 4, respectively, the 90
wire 2 connecting with the main *C*, the wire 3
with the main *C'*, and the wire 4 with the
main *C²*. The mains *C* and *C²* furnish cur-
rent to the contacts *c c'* of the relay *R*
through the wires 5 6, which branch there- 95
from, as shown. The relay *R* may be of any
of the well-known forms; but it will be ob-
served that there are a plurality of contact-
points controlled by its armature, this being
diagrammatically shown by an armature *r r'* 100
for each contact-point. The contact-points
are designated, respectively, *c c' c² c³*.

E E' designate circuit-controllers which
may be of any of the well-known types and
which act to open the circuit on the motor 105
when it has completed its movement of the
signal device.

F designates the motor referred to, the

same being operable by a current of two phases, as shown, and may be of any ordinary or usual construction, but should be of a corresponding phase to that of the generator D, which furnishes current. The motor has three brushes b b' b^2 , respectively, those designated b and b^2 being in circuit with the circuit-controllers E E' by the wires 7 8, while the brush b' connects with the main C' by the wire 9. The wires 7 and 8 connect also with wires 10 and 11, respectively.

G designates a magnet comprised in what is known in the art as a "slot-arm," forming part of the railway-signal-operating mechanism. The core of the magnet is shown as having three legs g g' g^2 , the legs g g^2 being supplied with coils 10^a 11^a . A current of one phase flows in one coil, while a current different in phase flows in the other coil. The coil 10^a is in circuit with the contact c^2 , and the coil 11^a is in circuit with the contact c^3 , and both coils are in circuit through wires 12 and 13 with the main C' . Thus when current from the generator D flows through the mains C C' C^2 and the armature of the relay R is attracted to its core the slot-magnet G will be energized, in which event the operating mechanism may move the signal device s from one position to another, or, should this have occurred, the slot-arm will hold or retain the signal device in the position to which it has been moved. The movement of the signal device s by the operating mechanism causes the circuit-controllers E E' to be operated to open the circuit to the motor F. This is well understood in the art.

The circuit controlling the operation of the signal mechanism may be traced as follows: From the generator D the two currents of different phase flow through the following circuits: The current of one phase starting at the generator D flows through wire 2, main C, wire 5, contact c , armature r , contact c^2 , wire 10, coil 10^a of slot-magnet G, wire 12, wire 13, main C' , and wire 3, back to generator D. The current of different phase, also starting at generator D, traverses wires 4 6 11, coil 11^a , wires 12 13, main C' , and wire 3, back to generator.

In Fig. 2 I have illustrated the circuits and other parts in the position they will assume when a train or car is moving into or occupies a block-section. T designates such a train or car herein represented as a pair of wheels and axle; the presence of which in the block short-circuits the battery B, thereby short-circuiting the track-circuit current from the coils of the relay R, which drops its armature. In so doing the circuits of the slot-magnet G are opened and the signal device moves by force of gravity to a position indicating "danger." When this occurs, the circuit-controllers E E' are moved to their closed position, as shown. When now the

train or car shall have passed out of the block-section A', the battery B will again magnetize the relay R, causing it to pick up its armature and close the circuits of the motor F and slot-magnet G to have the operating mechanism move the signal device to a position indicating "safety," the termination of such movement causing the circuit-controllers E E' to move to their former or open position, (illustrated in Fig. 1,) thereby opening the motor-circuit at the proper time. This condition of circuits is illustrated in Fig. 1. It will be seen, therefore, that my invention relates to the operation or control, or both, of a part or appliance for controlling or governing the passage of cars or trains along a railway by alternating currents of more than one phase. In the specific illustration of my invention the part or appliance is in the form of a railway-signal, and it is operated by a multiphase motor and controlled by a magnet energized by a multiphase current. It is apparent that the railway-signal may only require a multiphase motor. It is also apparent that instead of a railway-signal a railway-switch may be operated by a multiphase motor, or a train-stop may be operated by a multiphase motor and controlled by a multiphase magnet. As examples of the mechanism that may be employed for operating a switch or train-stop, reference may be had to United States Patents No. 768,204, dated August 23, 1904, and Reissue Patent No. 12,276, dated October 18, 1904. The motors in these apparatuses may be multiphase motors, and the other electromagnetic devices therein shown and described may be constructed to be or be operated by multiphase currents.

What I claim as my invention is—

1. In combination with a part or appliance for controlling the passage of a car or train along a railway, a motor for operating the same from one position to another, an electromagnetic device for holding the part or appliance in the position to which it has been moved, and a source of multiphase-current supply for said electromagnetic device.

2. In combination with a part or appliance for controlling the passage of a car or train along a railway, a multiphase motor for operating the same from one position to another, an electromagnetic device for holding the part or appliance in the position to which it has been moved, and a source of multiphase-current supply for said multiphase motor and electromagnetic device.

In testimony whereof I have signed my name to this specification in the presence of two subscribed witnesses.

LOUIS H. THULLEN.

Witnesses:

D. J. MCCARTHY,
W. L. MCDANIEL.