

(No Model.)

4 Sheets—Sheet 1.

C. E. BUELL.

ELECTRIC LIGHTING OF RAILWAY TRAINS.

No. 353,349.

Patented Nov. 30, 1886.

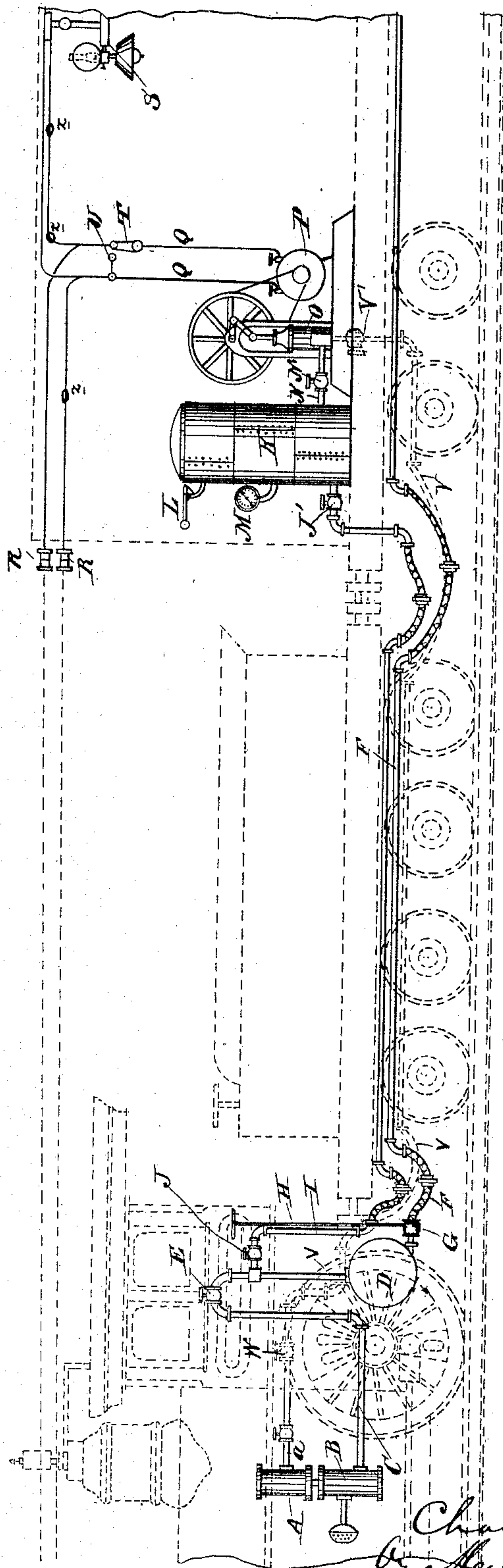


Fig. 1.



Fig. 4.

WITNESSES:

Frederick S. Dietrich
Chas. R. Burr

INVENTOR.

Charles E. Buell
By Melville Lehigh
His ATTORNEY.

(No Model.)

4 Sheets—Sheet 2.

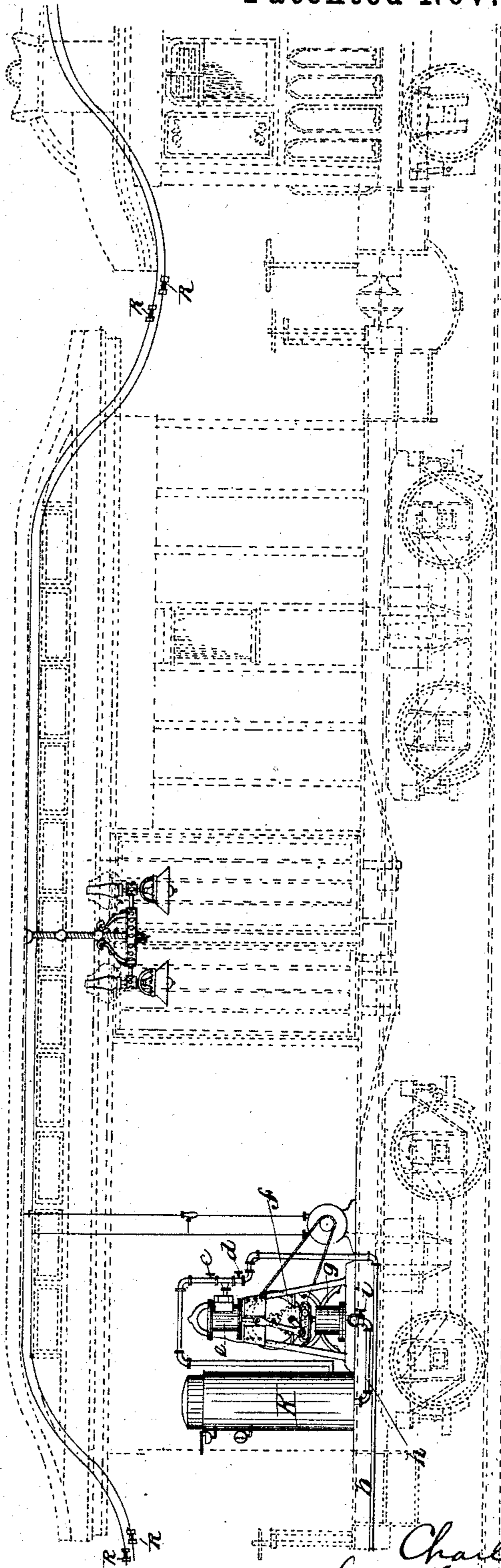
C. E. BUELL.

ELECTRIC LIGHTING OF RAILWAY TRAINS.

No. 353,349.

Patented Nov. 30, 1886.

Fig 2



WITNESSES:

Fred. G. Dieterich
James M. Durant

INVENTOR.

Charles E. Buell
by Melville Church
His ATTORNEY.

(No Model.)

4 Sheets—Sheet 3.

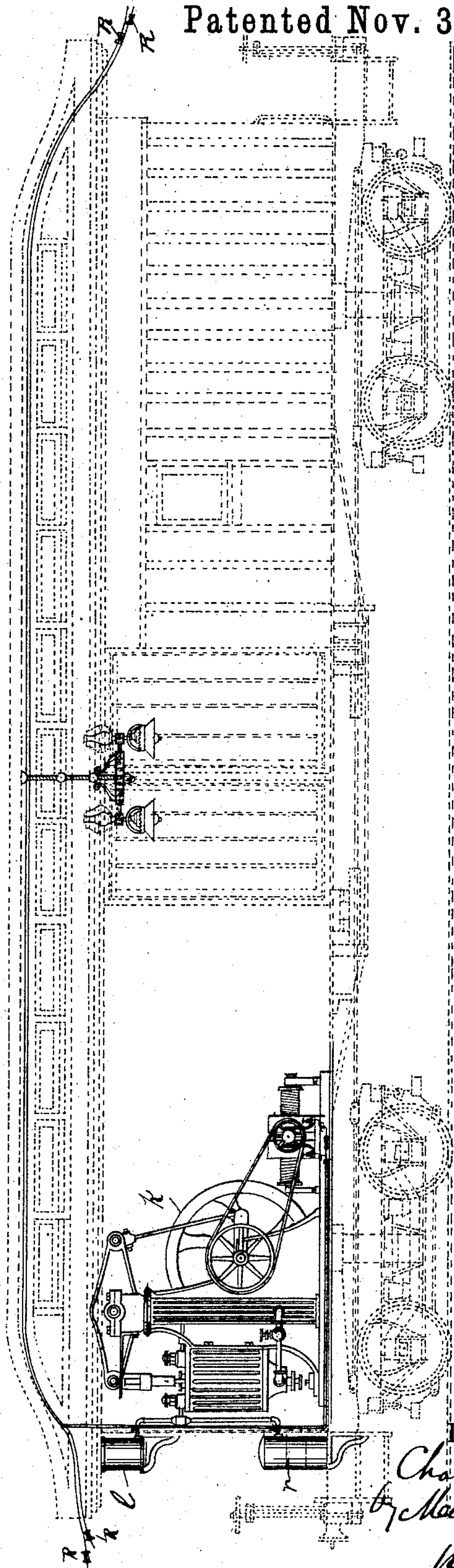
C. E. BUELL.

ELECTRIC LIGHTING OF RAILWAY TRAINS.

No. 353,349.

Patented Nov. 30, 1886.

Fig 3



WITNESSES:

Frederick G. Dietrich
James M. Durant

INVENTOR.

Charles E. Buell
by Marshall Church
ATTORNEY.

(No Model.)

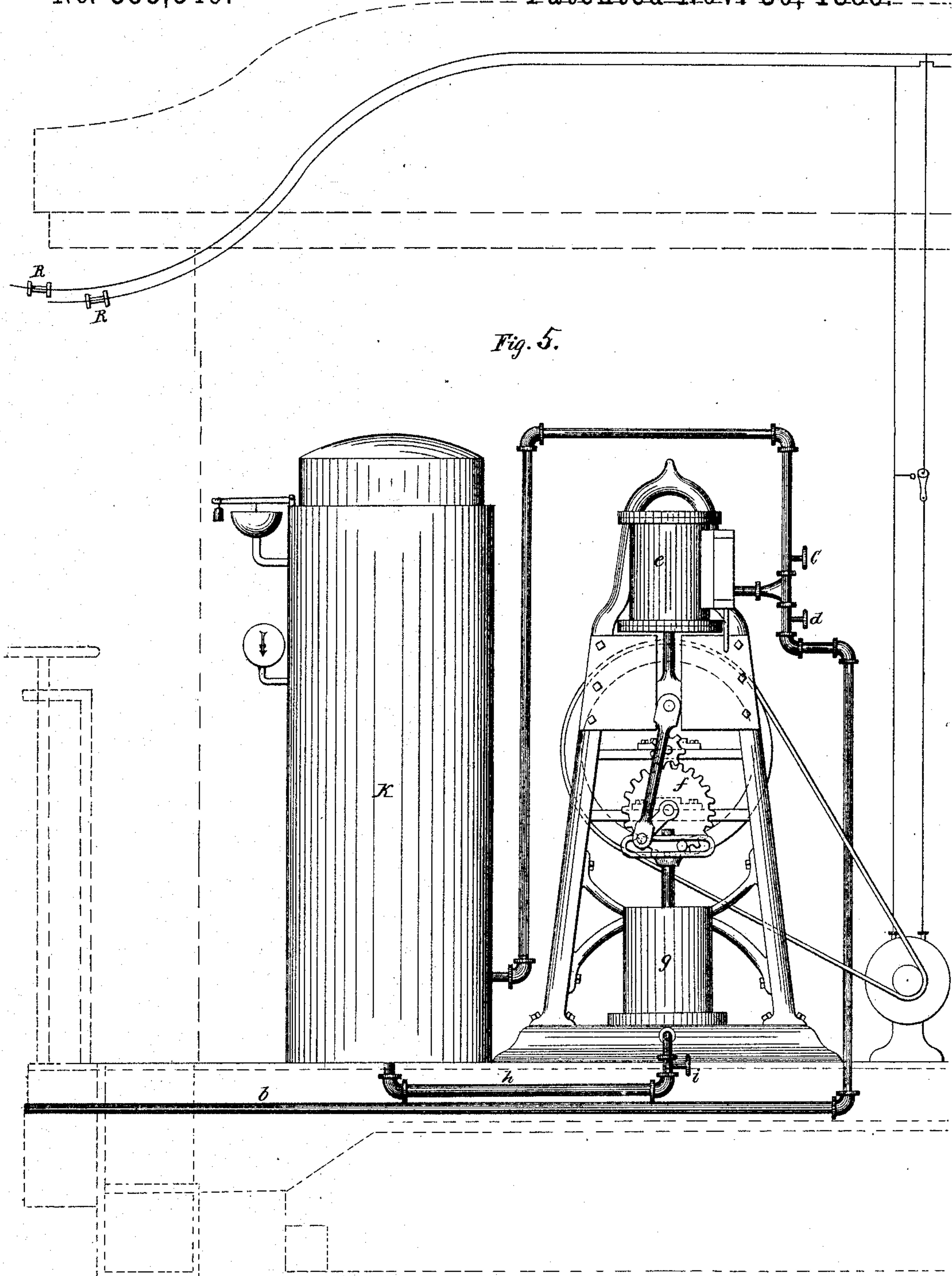
4 Sheets—Sheet 4.

C. E. BUELL.

ELECTRIC LIGHTING OF RAILWAY TRAINS.

No. 353,349.

Patented Nov. 30, 1886.



Witnesses:

W. C. Jordanston
Fred P. Church.

Inventor:

Charles E. Buell

by
Melville Chisholm
his Attorney.

UNITED STATES PATENT OFFICE.

CHARLES E. BUELL, OF NEW HAVEN, CONNECTICUT.

ELECTRIC LIGHTING OF RAILWAY-TRAINS.

SPECIFICATION forming part of Letters Patent No. 353,349, dated November 30, 1886.

Application filed August 9, 1882. Serial No. 68,862. (No model.)

To all whom it may concern:

Be it known that I, CHARLES E. BUELL, of New Haven, in the county of New Haven and State of Connecticut, have invented certain
5 new and useful Improvements in the Electric Lighting of Railway-Trains; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being
10 had to the accompanying drawings, forming part of this specification, and to the figures and letters of reference marked thereon.

My invention has for its object to improve the existing modes of lighting railway-trains by the direct current of an electrical generat-
15 ing-machine mounted upon the train itself, in such manner as to enable the lamps to be maintained, whether the locomotive-engine be connected or detached from the train, and whether the train be in motion or not.

20 To this end my invention consists in the combination, with the train and its electric-lamp circuit, including lamps, of an air-compressing apparatus arranged upon the locomotive, an air-holder arranged upon one of the
25 cars, a motor, and an electrical generating-machine for supplying the lamp-circuit, also on said car, with suitable connections between the compressor and the air-holder and the air-holder and the motor, whereby the motor is
30 enabled to be driven from the air-holder, whether the locomotive carrying the compressor be connected to the train or not.

It further consists in the combination, with the train and its electric-lamp circuit, includ-
35 ing lamps, of an air-compressor on the locomotive, an air-holder, motor, and electrical generating-machine, mounted on a separate vehicle of the train, with suitable connection between the compressor, air-holder, motor, and
40 electrical generating-machine, and a steam-pipe between the locomotive-boiler and the motor, whereby the motor is adapted to be run either by steam taken directly from the locomotive or by compressed air taken from the
45 air-holder, whether the train be at rest or in motion, and is also adapted to be run by the air in the air-holder when the locomotive is detached from the train.

50 In the accompanying drawings, Figure 1 represents a locomotive-engine and an attached baggage-car, the former carrying the air-com-

pressing apparatus and the latter the air-holder, motor, and dynamo-electric machine or generator. The electric-lamp circuit, including lamps, is also represented. Figs. 2
55 and 3 represent separate cars equipped in accordance with my invention, modified forms of apparatus being shown in each instance. Fig. 4 is a view of one of the fusible joints in the machine-circuit. Fig. 5 represents an en-
60 larged view of the embodiment of the invention shown in Fig. 2.

Similar letters of reference in the several figures denote the same parts.

Referring to Fig. 1, A represents the steam-
65 cylinder supplied by a steam-pipe, *a*, and B the compressing-cylinder of an ordinary air-compressing apparatus, such as usually employed upon a locomotive in a railway air-brake system.
70

C is a pipe leading from the cylinder B to a tank or holder, D, and having a valve, E, which can be opened or closed at pleasure.

F is a pipe leading from the air-holder D through the train, and serving as the conduit
75 for the compressed air employed to operate the brake system. This pipe has flexible sections and couplings between the several vehicles of the train, and admission of compressed air into it is controlled by a suitable
80 valve, G, whose stem H extends up into the engineer's cab.

Connected to the pipe C is another pipe, I, which is adapted to be opened and closed by a valve, J, and extends from pipe C through
85 a valve, J', into an air-holder, preferably an extensible holder, K, located on the baggage-car. Suitable flexible sections and couplings between the vehicles are applied to this pipe I similar to those employed on the pipe of the
90 brake system. The holder K is provided with a safety-valve, L, and pressure-indicator M, and from it extends a pipe, N, containing a valve, N', to an engine or motor, O, adapted to run by either steam or air. Motor O in turn
95 drives a dynamo-electrical machine, P, which is adapted to charge a lamp-circuit, Q Q, extending throughout the train, with couplings R between the several vehicles, and containing electric lamps S, of any approved construction.
100

A switch, T, is normally included in the

light-circuit, but may be turned to a contact, U, when it is desired to place the machine upon a developing-circuit, as will be readily understood.

5 Extending from the locomotive directly to the motor O is a steam-pipe, V, the passage of steam through which is controlled by a valve, W.

When the locomotive is coupled to the
10 train, the air-holder K can be kept full of compressed air by the operation of the compressor upon the locomotive, and the motor O can be supplied from said holder; or the holder K may be kept full of compressed air and the
15 motor run directly by steam supplied through the pipe V, communication between the holder K and motor being in this latter case of course cut off by the valve N'. The motor and the dynamo connected to it can thus, it will be
20 seen, be operated so as to charge the lamp-circuit, whether the train be at rest or in motion. Upon the disconnection of the locomotive from the train, however, a valve, V', in the steam-induction pipe is closed, as is also the valve
25 J' in the air-pipe leading to the air-holder K, and the compressed air in the holder is utilized to run the motor by the regulation of the valve N' in the pipe between said holder and motor. The holder is preferably extensible
30 or telescopic, and as the air is withdrawn from it the weight of its sliding section operates to preserve a uniform pressure upon it.

Instead of employing the same air-compressing apparatus that is employed in connection
35 with the air-brake system, a separate apparatus may be mounted upon the locomotive.

A modification of the equipment of the baggage-car is shown in Fig. 2. In said figure a
40 single pipe, b, is adapted to convey either compressed air or steam from the locomotive to run a combined motor and air-compressor. The valve c being closed and the valve d being opened, the steam or air is admitted to the cylinder e, and the piston of the latter, through
45 the pitman and gearing shown, drives the pulley f, to which the dynamo is belted, as well as the piston in an air-compressing cylinder, g, and the air compressed in the latter is conveyed through a pipe, h, containing a valve,
50 i, into the air-holder K. In this way the surplus power of the air or steam brought through the pipe b over and above that required to drive the dynamo is stored in the holder K, and can be utilized to run the motor, when the
55 locomotive is detached from the train, by closing valves i d and opening valve c.

A further modification of my invention is shown in Fig. 3, wherein the independent motor employed upon the car for driving the
60 dynamo j consists of an ordinary Brayton gas-engine, k. For the purpose of economy of space within the car, and to avoid the odor of gasoline employed, I arrange the gasoline-tank l and the air-holder m outside of the car,
65 as shown. The lamp-circuit and connections shown in this figure are substantially the same as those shown in other figures. The air may

be stored in the holder upon the car by means of an air-compressing engine operated by a wind-wheel arranged upon the car and adapted to be put in motion by the movement of the
70 train in either direction, as shown in my application for patent filed August 4, 1882.

The advantages of employing an independent motor by which the dynamo can be caused
75 to maintain the lamps when the locomotive is detached from the train, and independent of the movement of the train, have been alluded to hereinabove; but there are other special advantages in using compressed-air motors—
80 namely, the comparative cleanliness of them, the small amount of space which they occupy, and the freedom from the danger of fire should the cars become derailed and overturned.

I have shown the compressing devices and
85 motors in a relatively larger scale than is observed in practice in order that their construction might be better understood.

For the purpose of preventing damage in case of the accidental short-circuiting of the machine from any cause, I preferably unite the
90 conductors of the circuit at one or more points by joints of solder fusible at a temperature of 140° to 160°, as shown at z z z d 4. Any rise of temperature in the conductors of
95 the circuit within the limits mentioned due to the short-circuiting of the machine or to the rise in the temperature of the atmosphere of the car will cause the solder to melt and the
100 circuit to be broken.

Having thus described my invention, I claim as new—

1. In a system of electric lighting for railway-trains, the combination, with the train and its electric-lamp circuit, including lamps, of an
105 air-compressing apparatus arranged upon the locomotive, an air-holder arranged upon one of the cars, a motor, and an electrical generating-machine for supplying the lamp-circuit, also on said car, with suitable connections be-
110 tween the compressor and the air-holder and the latter and the motor, whereby the motor is enabled to be driven from the air-holder, whether the locomotive carrying the compressor be connected to the train or not. 115

2. In a system of electric lighting for railway-trains, the combination, with the train and its electric-lamp circuit, including lamps, of an air-compressor on the locomotive, an air-
120 holder, motor, and electrical generating-machine mounted on a separate vehicle of the train, with suitable connections between the compressor, air-holder, motor, and electrical generating-machine, and a steam-pipe be-
125 tween the locomotive-boiler and the motor, whereby the motor is adapted to be run either by steam taken directly from the locomotive or by compressed air taken from the air-holder, whether the train be at rest or in motion, and is also adapted to be run by the air in the air-
130 holder when the locomotive is detached from the train, substantially as described.

3. The combination, with a railway-train, of an electric circuit thereon, including translat-

ing devices, a dynamo-electric machine for supplying said circuit, and a motor for driving said dynamo, a compressed-air holder, and a means of communicating between the air-
5 holder and a motor and a pipe connecting the locomotive-boiler with the motor, whereby the motor can be run either by the steam from the boiler or by compressed air from the holder, substantially as described.

10 4. The combination, with a railway-train and mounted upon the same, of an air-com-

pressing apparatus, an air-holder charged by the air-compressing apparatus, an air-motor operated by air from the holder, and an electrical generating-machine operated by the motor, and an electric circuit containing electric
15 lamps fed by the generator, substantially as described.

CHARLES E. BUELL.

Witnesses:

FRED F. CHURCH,

W. C. JIRDINSTON.