

[54] GAS TURBINE AND ELECTRIC DRIVE LOCOMOTIVE	1,502,546	7/1924	Buchli .....	105/62 B
	1,529,163	3/1925	Buchli .....	105/62 B
[75] Inventor: Andre E. Pelabon, Paris, France	2,118,814	5/1938	Holzwarth .....	105/62 B
	2,575,242	11/1951	Allen .....	105/61.5
[73] Assignee: ANF Frangeco S.A., Hauts de Seine, France	2,967,915	1/1961	Dean .....	191/49
	3,457,877	7/1969	Ostermeyer .....	105/61.5

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- [51] Int. Cl. .... B61c 7/04; B61c 9/36; B61c 9/38
- [58] Field of Search ..... 105/34 P, 61.5, 36, 62 B,  
105/182 E, 49; 191/49

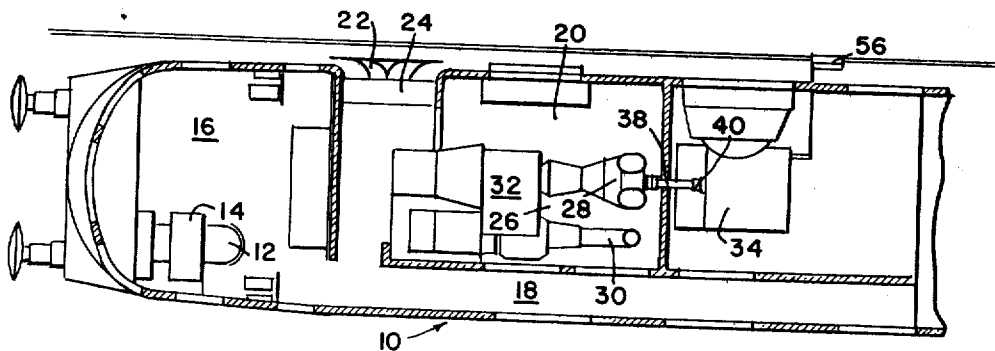
[57] **ABSTRACT**

A train or railway car and the like powered by a gas turbine having an auxiliary electric motor selectively connected to a gear train to drive the car for propelling it in and through areas of operation in underground or urban areas, thus avoiding causes of pollution either at start-up or driving operation, and for allowing a thermal engine to propel the car through high speed operations.

[56] **References Cited**  
**UNITED STATES PATENTS**

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2 Claims, 2 Drawing Figures



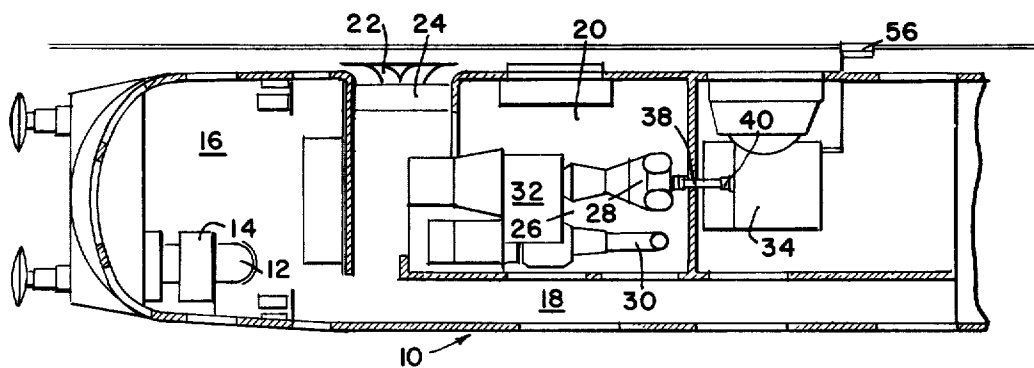


FIG. 1

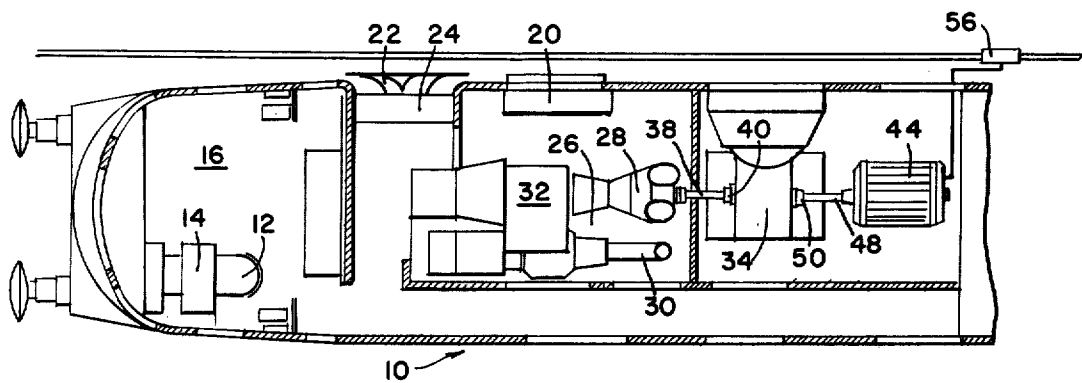


FIG. 2

## GAS TURBINE AND ELECTRIC DRIVE LOCOMOTIVE

### CROSS-REFERENCES TO RELATED INFORMATION AND REFERENCES

This application for patent is co-pending with at least the following related applications concurrently filed herewith: Ser. No. 350,807, for Gas Turbine powered Self-Propelled Railway Train, which discloses and claims a traction power car equipped with a single free running gas turbine engine connected to the driving wheels of at least one bogie by means of a hydraulic clutch and torque converter means including reversing gear means for driving the train in both directions from a standing stop to full speed; and Ser. No. 350,806, for Mechanism To Compensate for Axial Displacement of Rotating Elements in a Mechanically Driven Railway Bogie, which discloses and claims a mechanism to transfer power to the axles of a bogie from a shaft connected to a prime mover mounted in the car.

### BRIEF SUMMARY OF THE INVENTION

The present invention relates to gas turbine powered railway cars being powered or propelled by an electric motor for driving the gear train thereof, and more particularly, the invention relates to gas turbine propelled railway cars being secondarily propelled by electric motor(s) with a view to avoiding essentially all pollution effects that may be produced either at start-up or during operation, or both, while the railway car is underground or operating in relatively urban areas.

### FIELD OF THE INVENTION

The invention provides for the possibility of mounting in the railway vehicle's engine compartment an electric engine that will propel the gear box in alternation with the thermal engine.

At train start-up time or during the train's passage underground or through urban settlements, when it is not useful to use the thermal engine, the electric motor alone is available to propel the gear train for driving the railway car and with the thermal traction engine shut off completely automatically.

### BACKGROUND OF THE INVENTION

In existing types of gas-turbine trains designed for operation on non-electrified main lines, gear-box or gear train propulsion is produced only by thermal engines, thereby inducing pollution of the environment when the trains run in either underground or urban areas.

In view of the present urgency for eliminating or at least reducing pollution, the present invention is designed essentially to do away with pollution in the above cases. To this end, the possibility of the adaptation of electric traction which would replace the thermal engine at start-up as well as during underground and urban operation solves this problem insofar as it is possible, in areas in which pollution should be avoided, to supply the train with electric current via a catenary, a third rail, a pantograph or other current collectors.

It is an object of the present invention to provide means for reducing or doing away with any production of pollution effects as a result of operating types of gas-turbine trains which incorporate the present invention.

A further object of the invention is to provide selective means for coupling thermal or electric engines to drive railway cars. The electric motor may have only a

limited power, since in the areas in question and over the short distances considered, a limited speed is sufficient within the purview and purposes of the invention.

The electric current supplying the electric motor is captured by means of current collectors described above, under limited speed conditions; but during high-speed operations, the thermal engine normally takes over from the electric motor which is thereby shut off completely automatically.

Thus it is seen that by the means and method of the invention coupler means are provided so that the thermal engine drives the railway car while in high speed conditions, and the electric motor drives the railway car in start-up and under limited speed conditions. Either engine may drive the railway car by means of selective use of the coupler means to engage either the thermal engine or the electric motor to the gear box driving the car. The coupler means may, of course, be a clutch, a free wheel, a hydraulic or magnetic coupler, and the like, as well known in the art.

### BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWING

The above and other objects and advantages of the invention will become apparent upon full consideration of the following detailed description and accompanying drawings in which:

FIG. 1 shows a diagram along a horizontal cross-section of a front portion of a gas-turbine powered railway car according to the present arrangement of the art; and

FIG. 2 shows a diagram of a horizontal cross-section of the front portion of a gas-turbine powered railway car having an auxiliary electric drive and selectively coupler means for alternative motivation of the car.

### DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the drawing, there is shown a front portion of a railway car 10 having a control position 12, and a control panel 14 located in a control room 16. Connected with the control room 16 is a passageway 18 that connects with an engine room 20.

Air is taken into the engine compartment or the engine room 20 through an intake scoop 22, a filter section 24 having sound attenuating or deadening louvres, as desired, and the air is fed to the thermal engine 26 comprising a main traction turbine 28 and an auxiliary turbine 30.

The engine room 20 further includes a gear train or gear box unit, also called and shown as a gear box 34, for convenience, for providing an application of torque power from the main turbine 28 to the traction truck (not shown) by a connecting shaft 38 and a selective coupler means 40.

Also shown in the engine room 20 is an electric engine or motor 44 for auxiliary or ancillary use as shown in FIG. 2. It is shown coupled by a shaft 48 and a selective coupler means 50 to the gear box 34.

The selective coupler means 40, 50 may, of course, be means for enabling the disconnection or connection either of the electric motor 44 or the thermal engine 26 including the main turbine 28, and may be, for example, a clutch, a free wheel, a hydraulic coupler, a magnetic or other form of coupler means well known in the art.

In the preferred concept according to the invention shown in FIG. 2, the engine compartment 20 includes the gear box 34 propelled or driven either by the electric engine 44 or by the thermal engine 28, both of them being interconnected to the gear box 34 by connection shafts 38, 48. Each of the connection shafts 38, 48 can be connected to the gear box 34 by a device 40, 50 for enabling the disconnection either of the electric engine 44 or the thermal engine 28. Such a device, however, is not indispensable if it is possible for either engine in the idle state to be propelled safely by the other engine by means of the gear box 34.

The motive force for the electric engine 44 is provided by means of a third rail current collector 56, shoe, pantograph, catenary, or the like.

Additional embodiments of the invention in this specification will occur to others and therefore it is intended that the scope of the invention be limited only by the appended claims and not by the embodiment described hereinabove. Accordingly, reference should be made to the following claims in determining the full scope of the invention.

What is claimed is:

1. In a railway train of the type wherein at least one of the cars comprises a power car which includes prime mover means for propelling said train, the combination including a single free running gas turbine engine contained in said car, an electric engine contained in said car to be energized from a source exterior to said car, gearbox means including reversing gear means for mechanically transmitting motive power to the wheels of at least one of the bogies of said power car, and coupler means for selectively coupling said gas turbine engine and said electric engine to said gearbox means to transmit power selectively from only one prime mover means during any particular operational period, whereby each of said engines may selectively directly supply power to the same bogie wheels for propelling said train through the coupler means in either direction.

2. The invention according to claim 1 wherein electrical energy for supplying the electric engine is provided by means of current collector means.

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