US 20090101041A1

(19) **United States**

(12) **Patent Application Publication**

Burns et al.

(10) **Pub. No.: US 2009/0101041 A1**

(43) **Pub. Date: Apr. 23, 2009**

(54) **TRANSVERSAL GENERATOR SET AND MODULAR DESIGN FOR REFURBISHMENT OF LOCOMOTIVES**

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(21) Appl. No.: **12/143,390**

(22) Filed: **Jun. 20, 2008**

Related U.S. Application Data

(60) Provisional application No. 60/929,286, filed on Jun. 20, 2007.

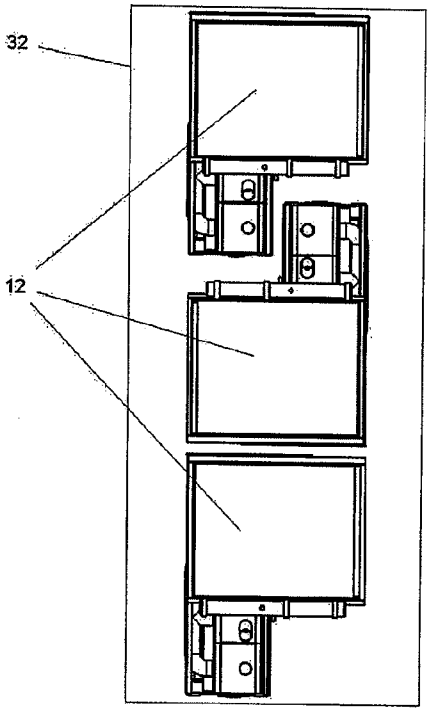
Publication Classification

(51) **Int. Cl.**
B61C 7/04 (2006.01)
B61D 17/00 (2006.01)

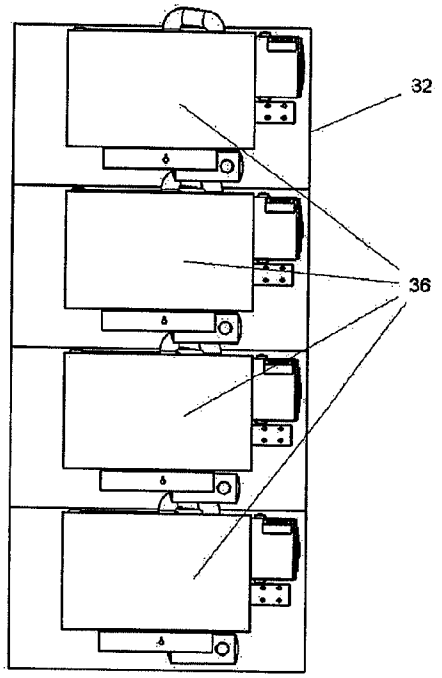
(52) **U.S. Cl.** **105/35**; 105/413

(57) **ABSTRACT**

A generator set has a transversal configuration on the locomotive. The generator set and its configuration on the platform offer good performance with respect to the space it occupies along the length of the locomotive platform deck, and offer better access for maintenance purposes. A walkway interface structure supports a modular design for locomotives using standardized major sub-assemblies that can be easily interfaced from one locomotive and under-frame to another.



ACTUAL



TRANSVERSAL

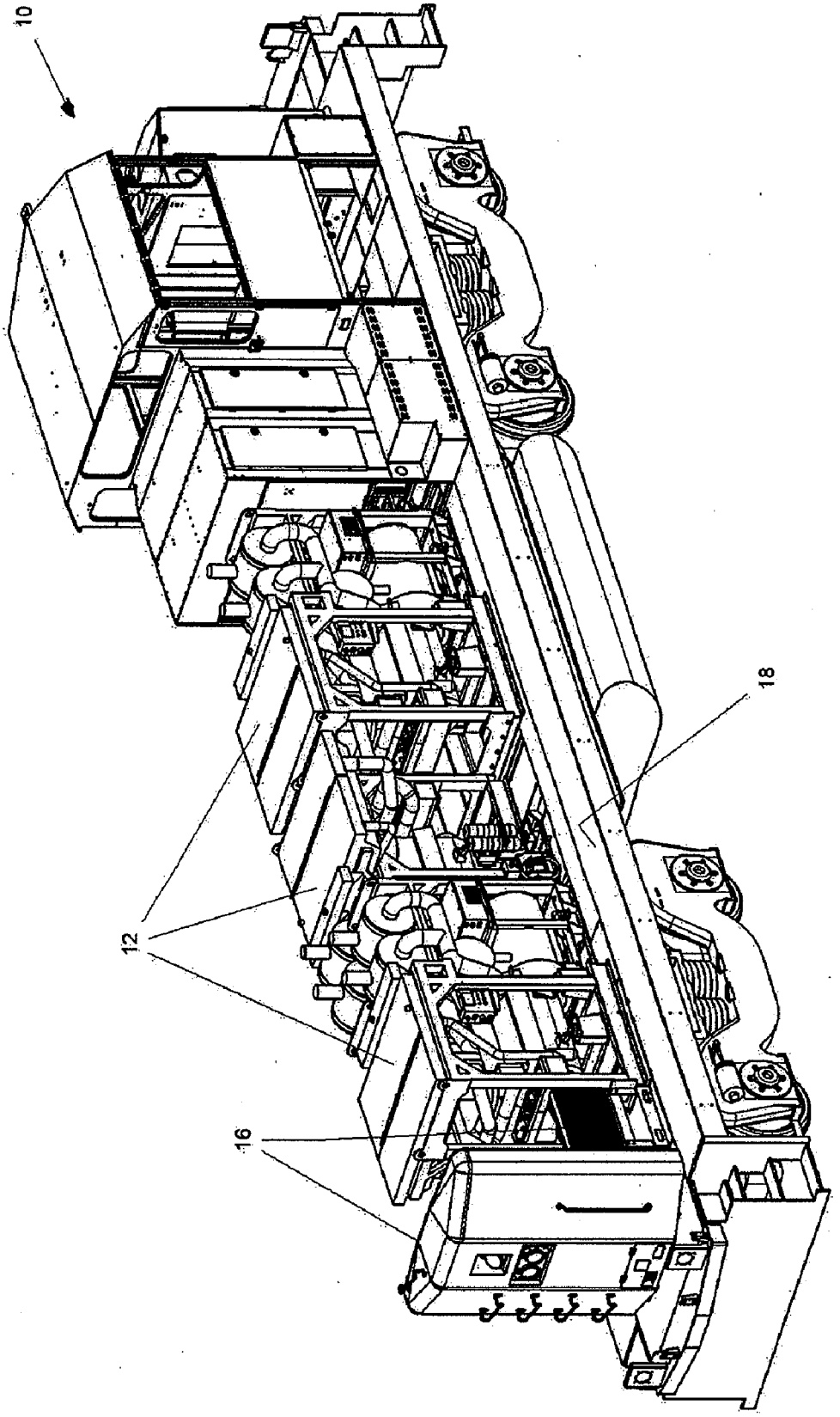


FIGURE 1 (PRIOR ART)

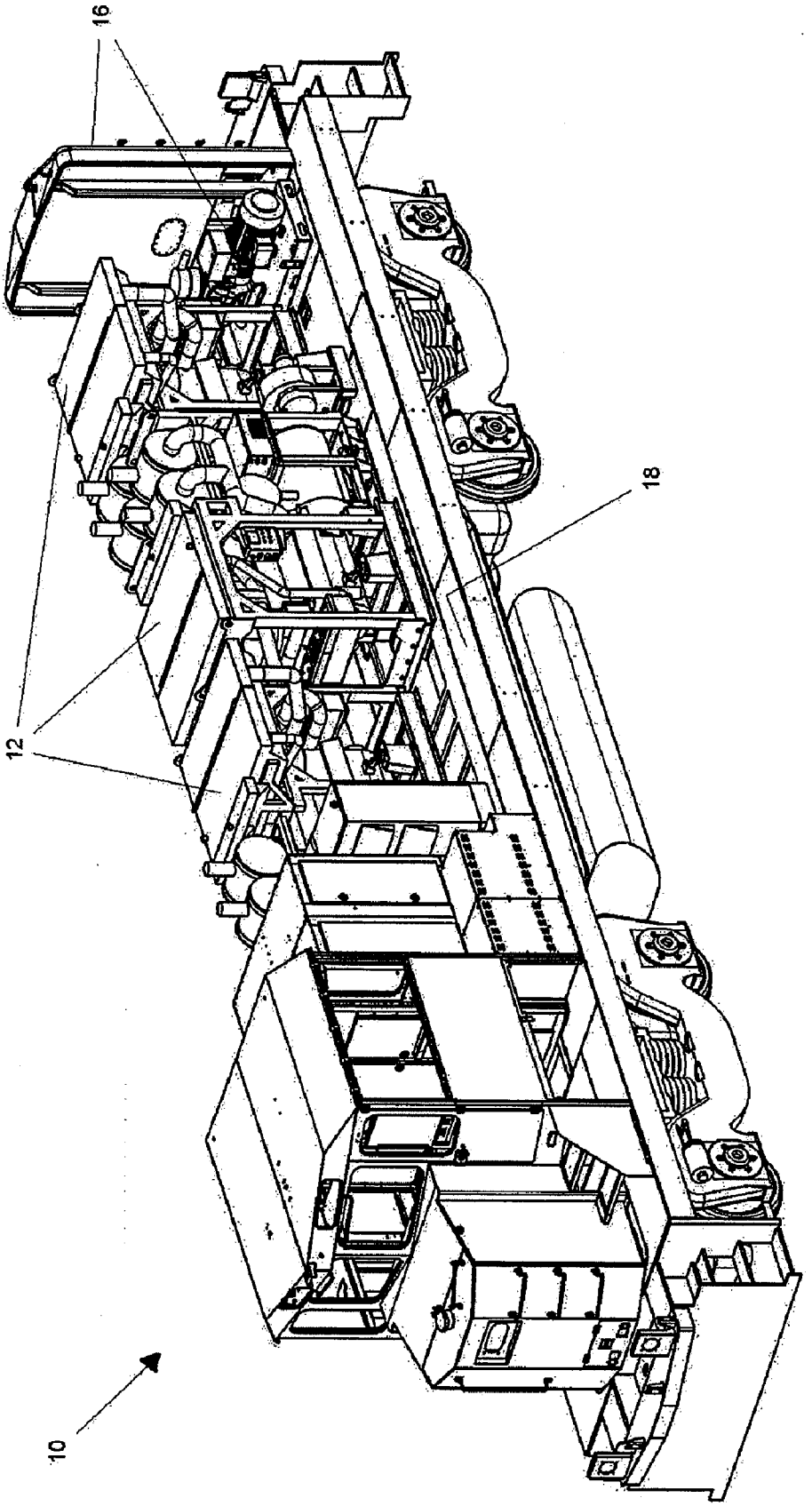


FIGURE 2 (PRIOR ART)

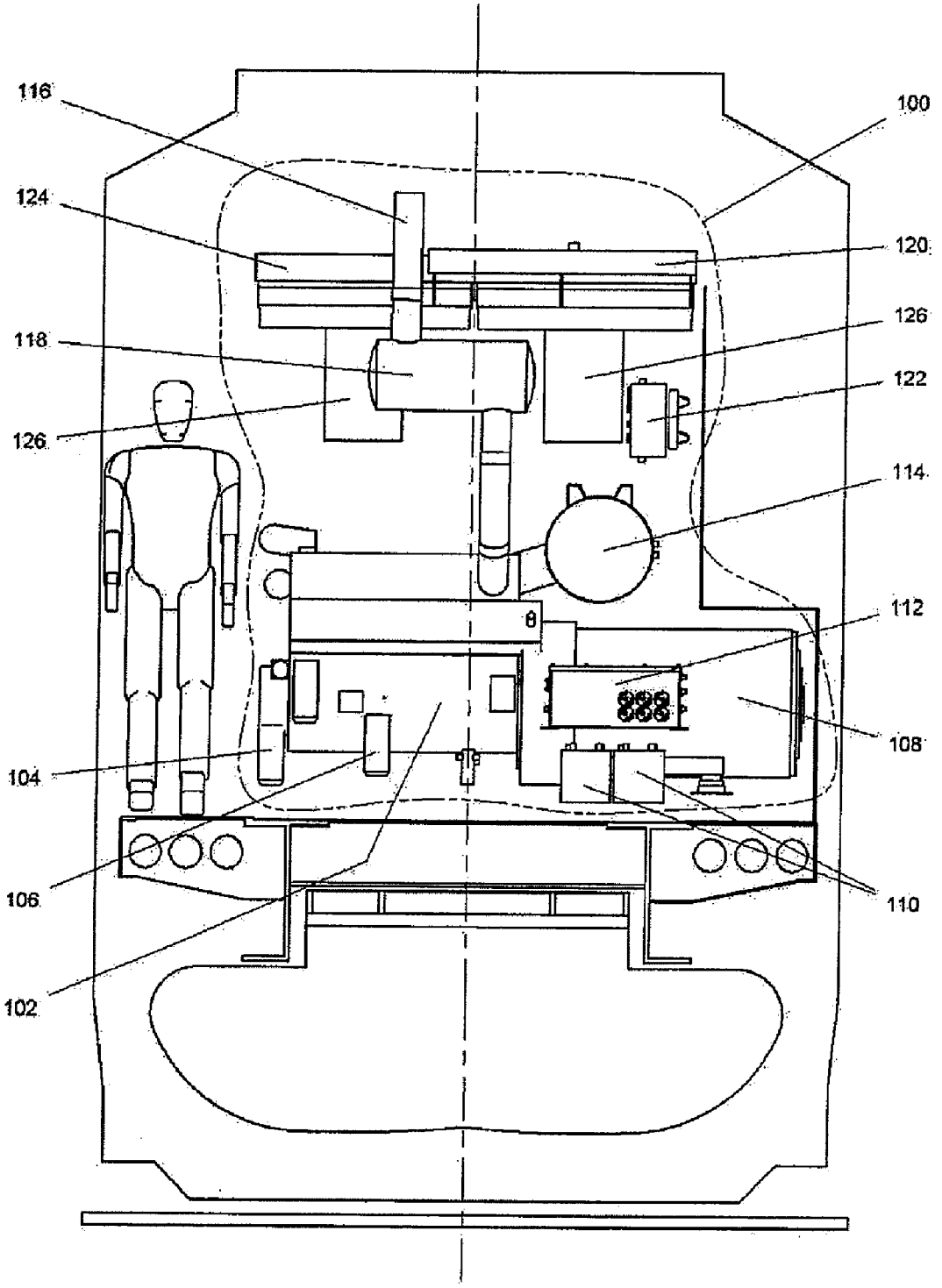
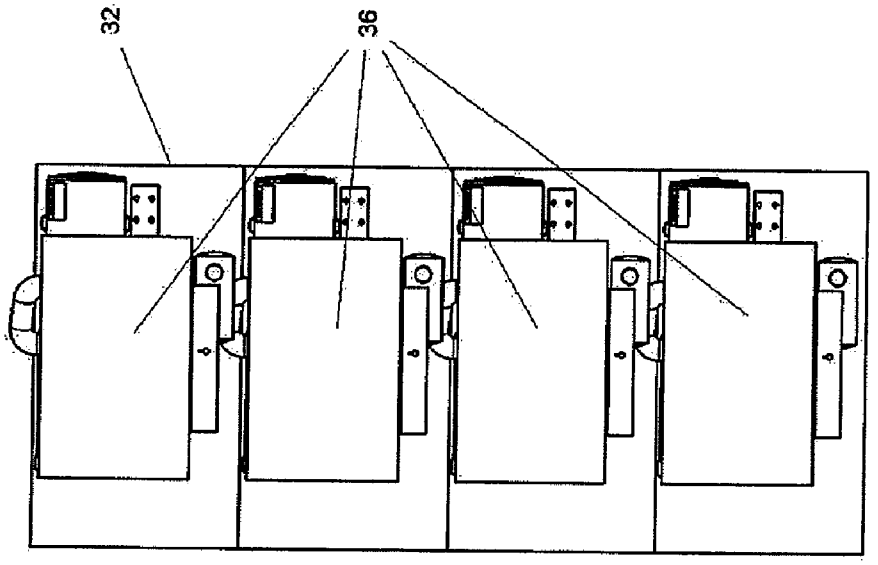


FIGURE 3



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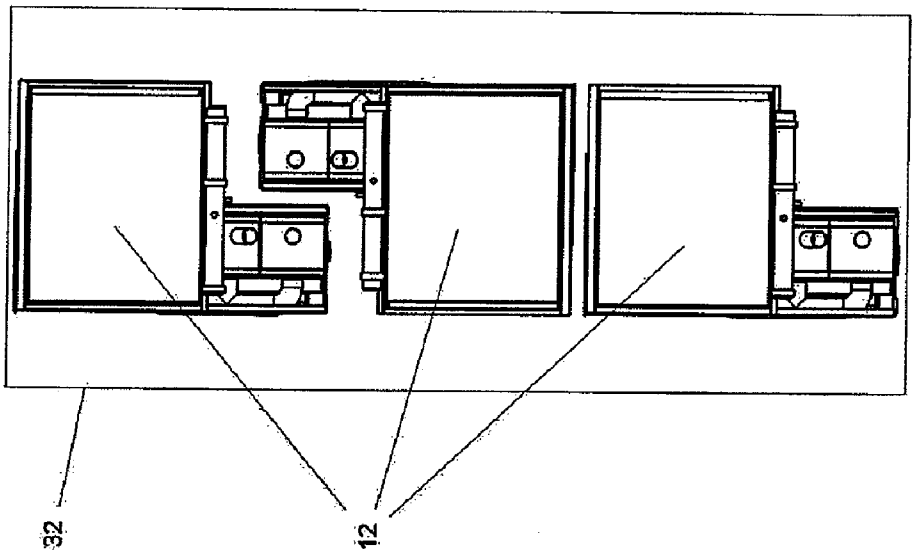


ACTUAL

FIGURE 4

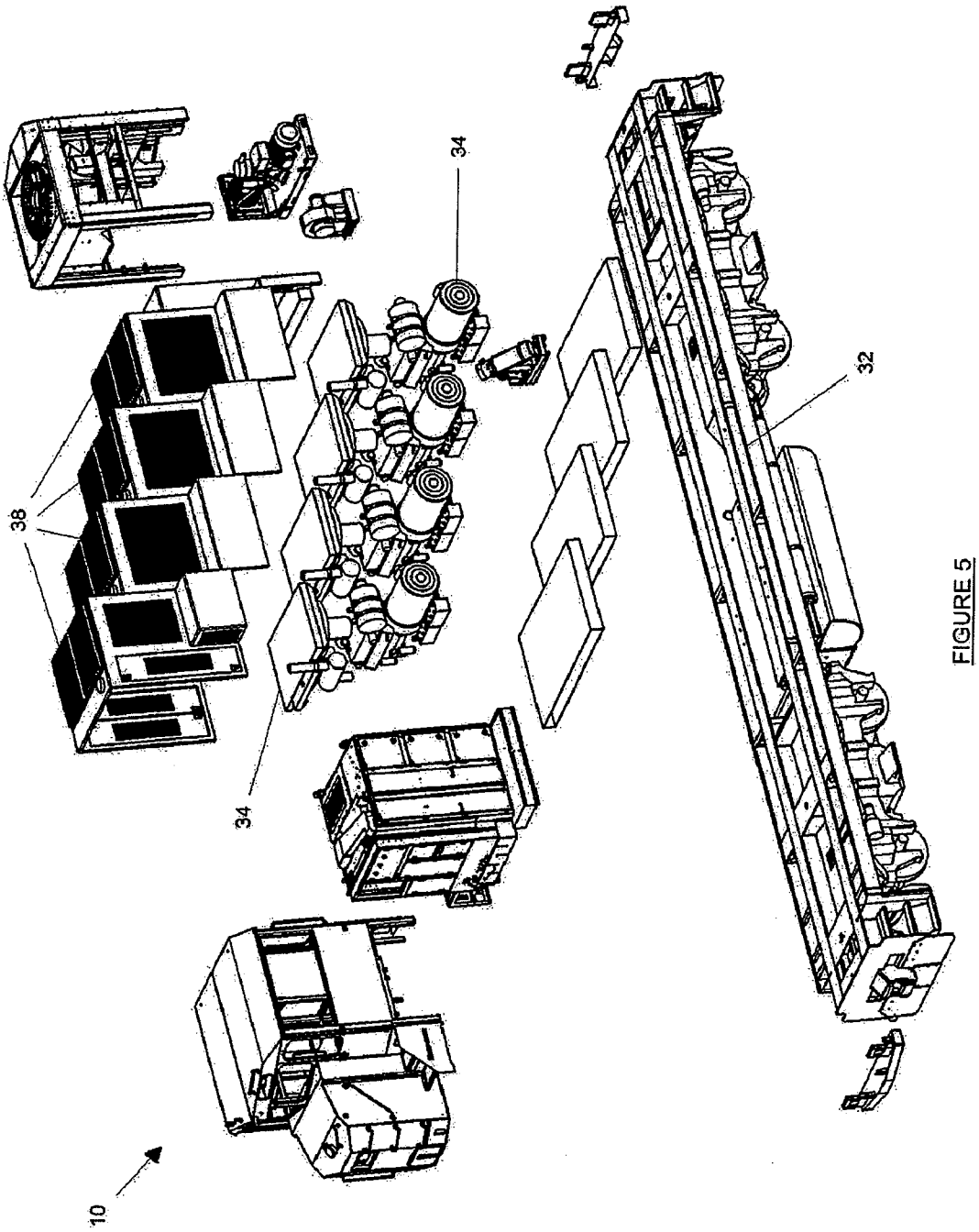
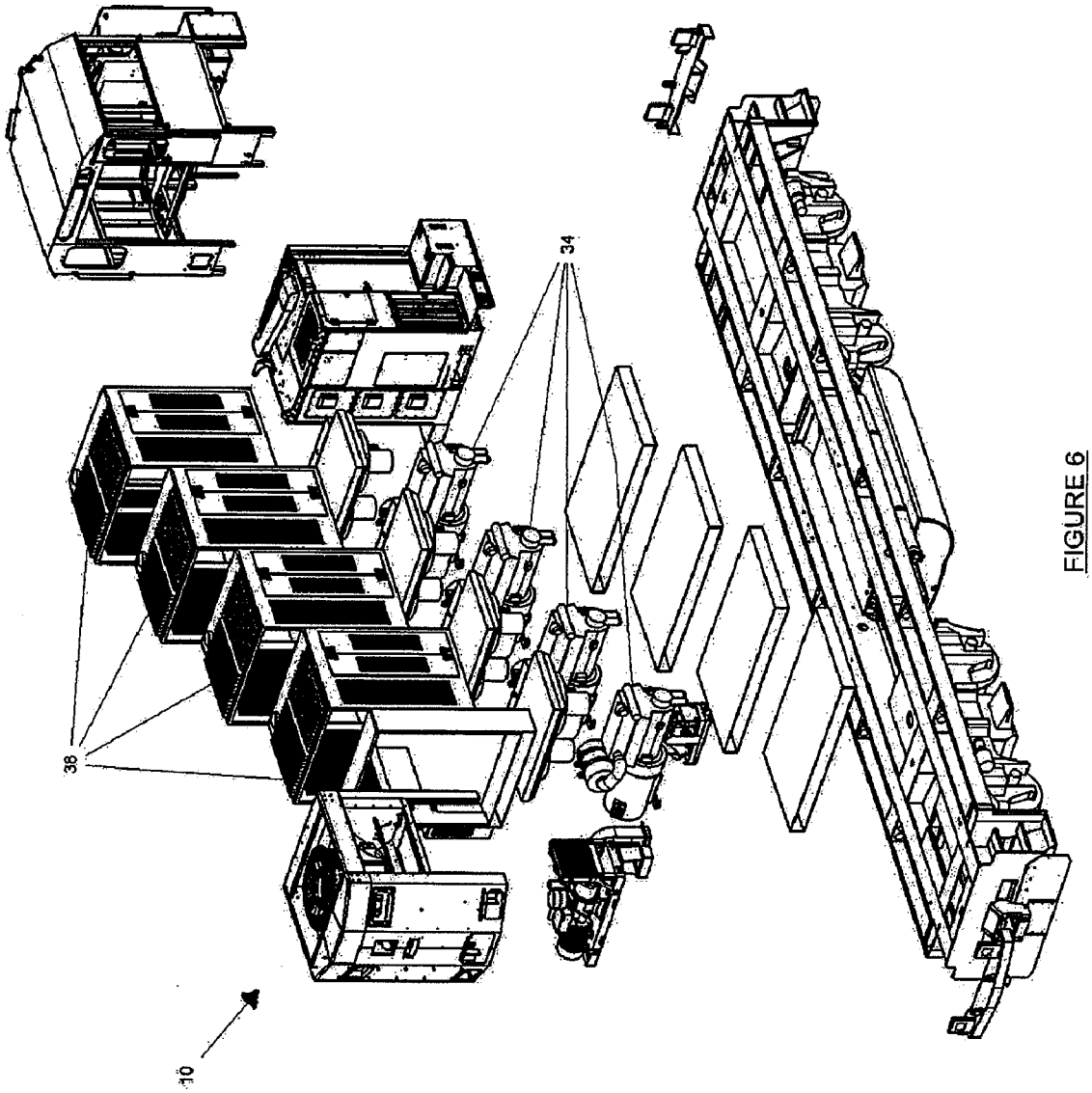


FIGURE 5



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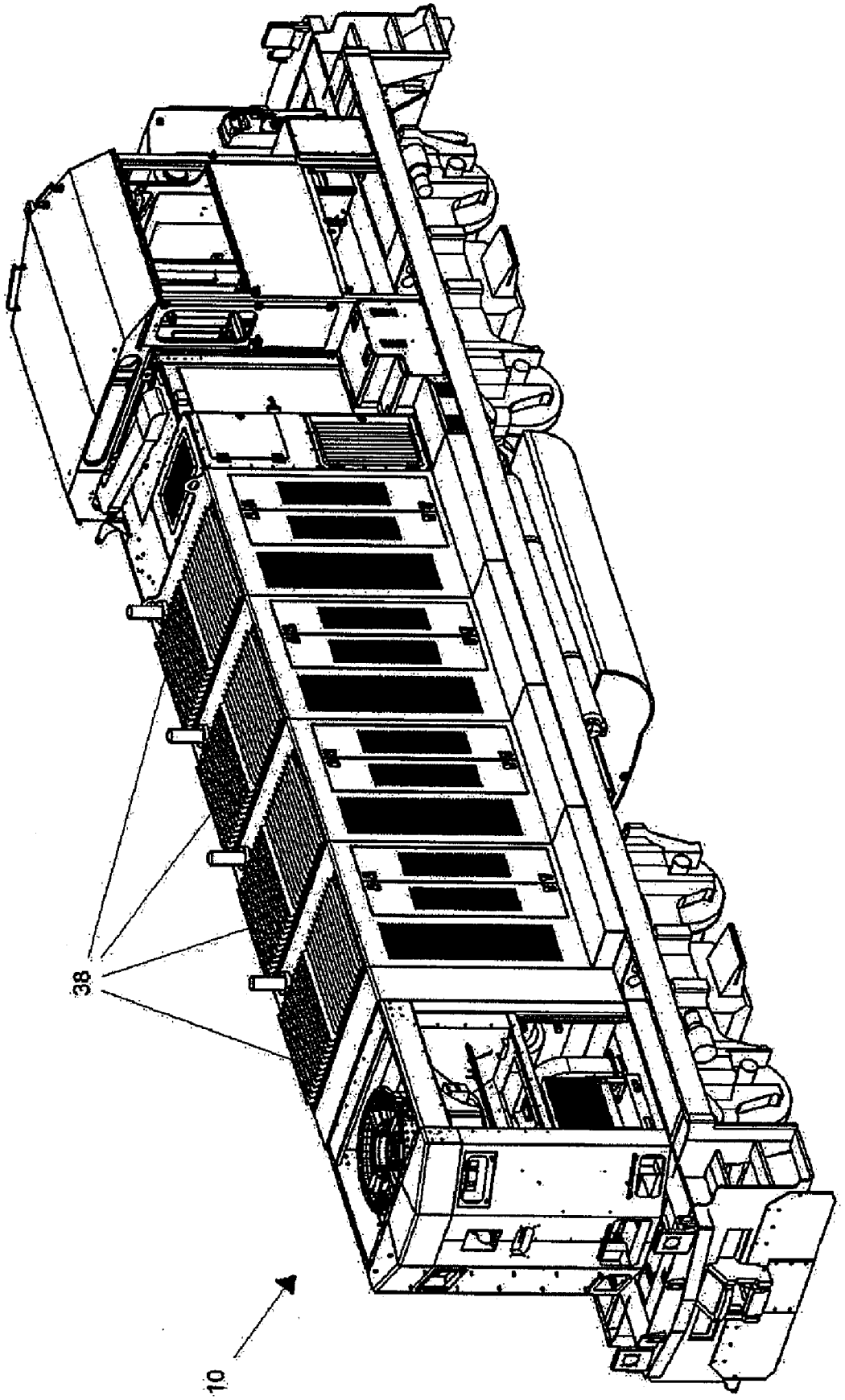
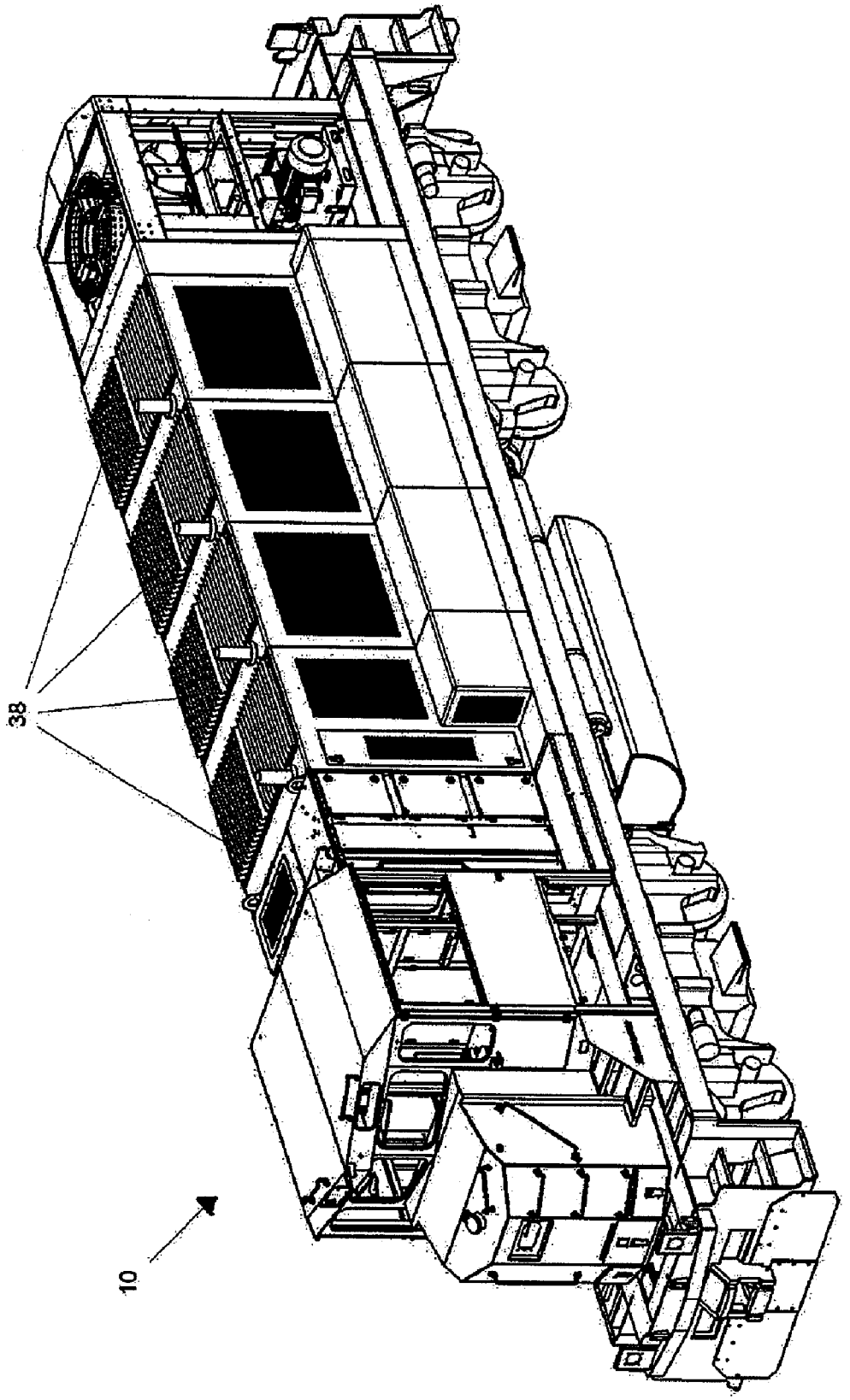


FIGURE 7



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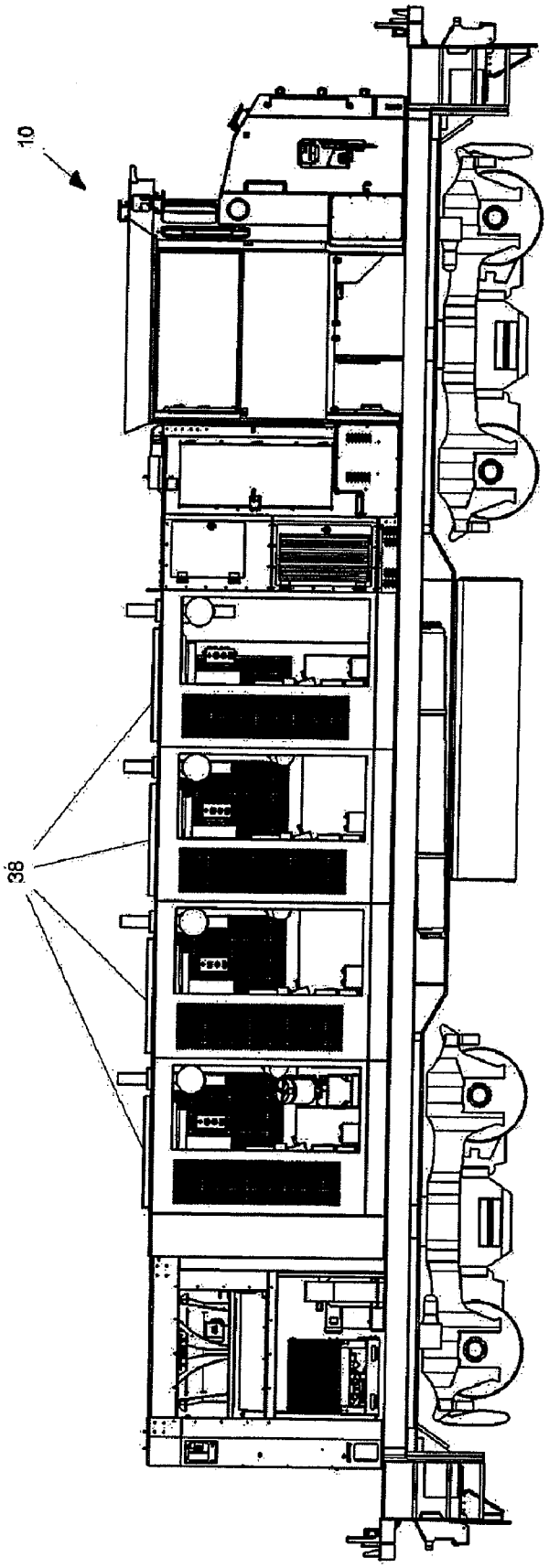

FIGURE 9

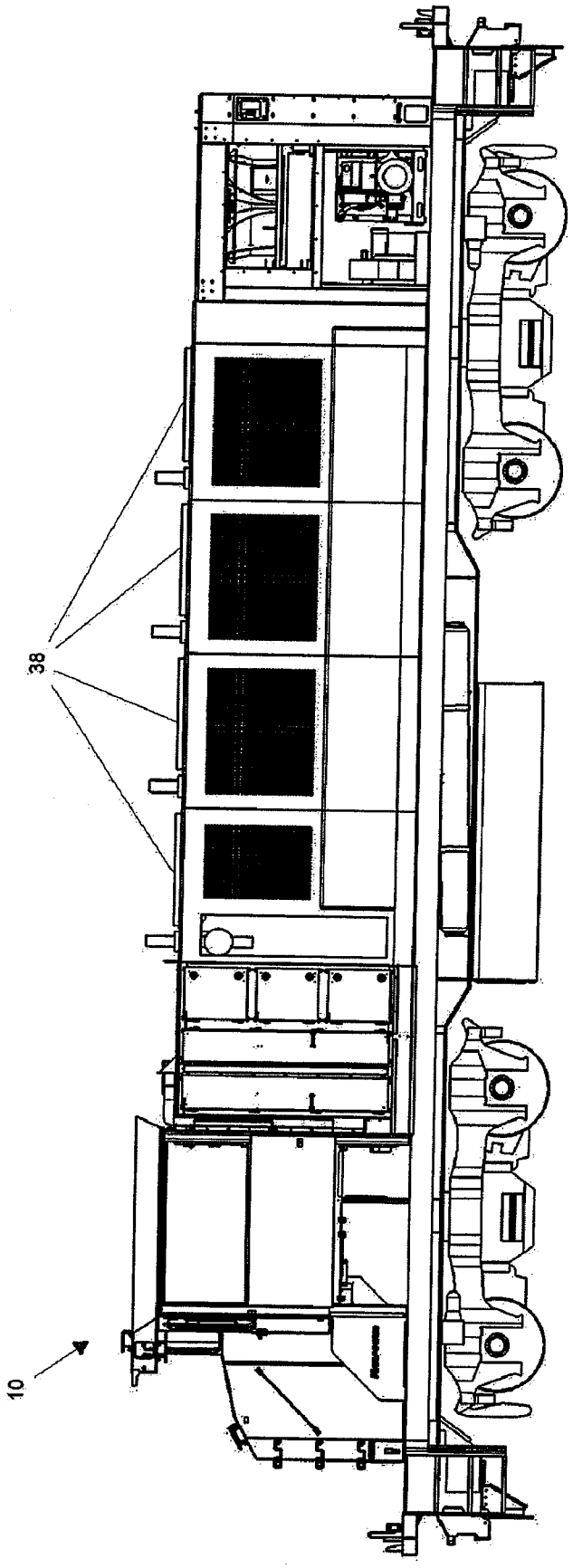

FIGURE 10

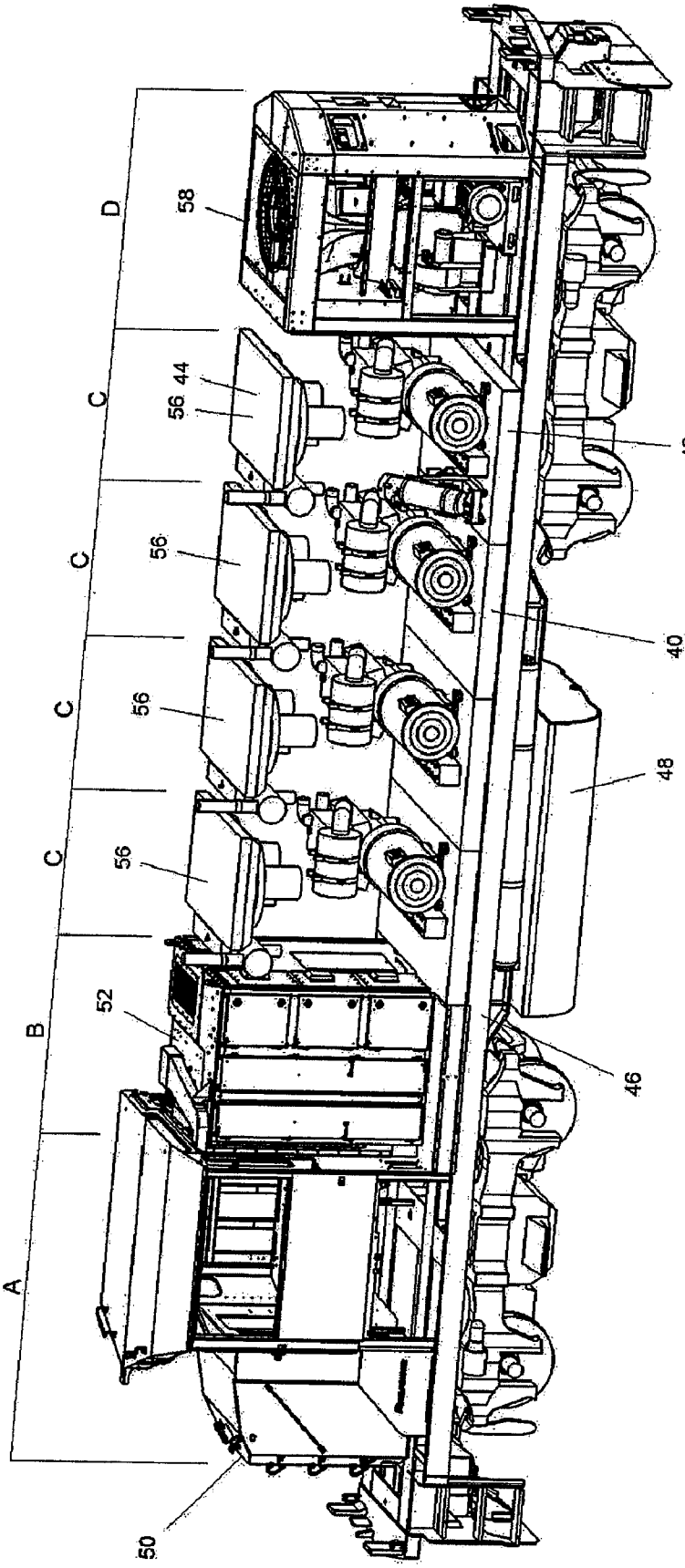

FIGURE 11

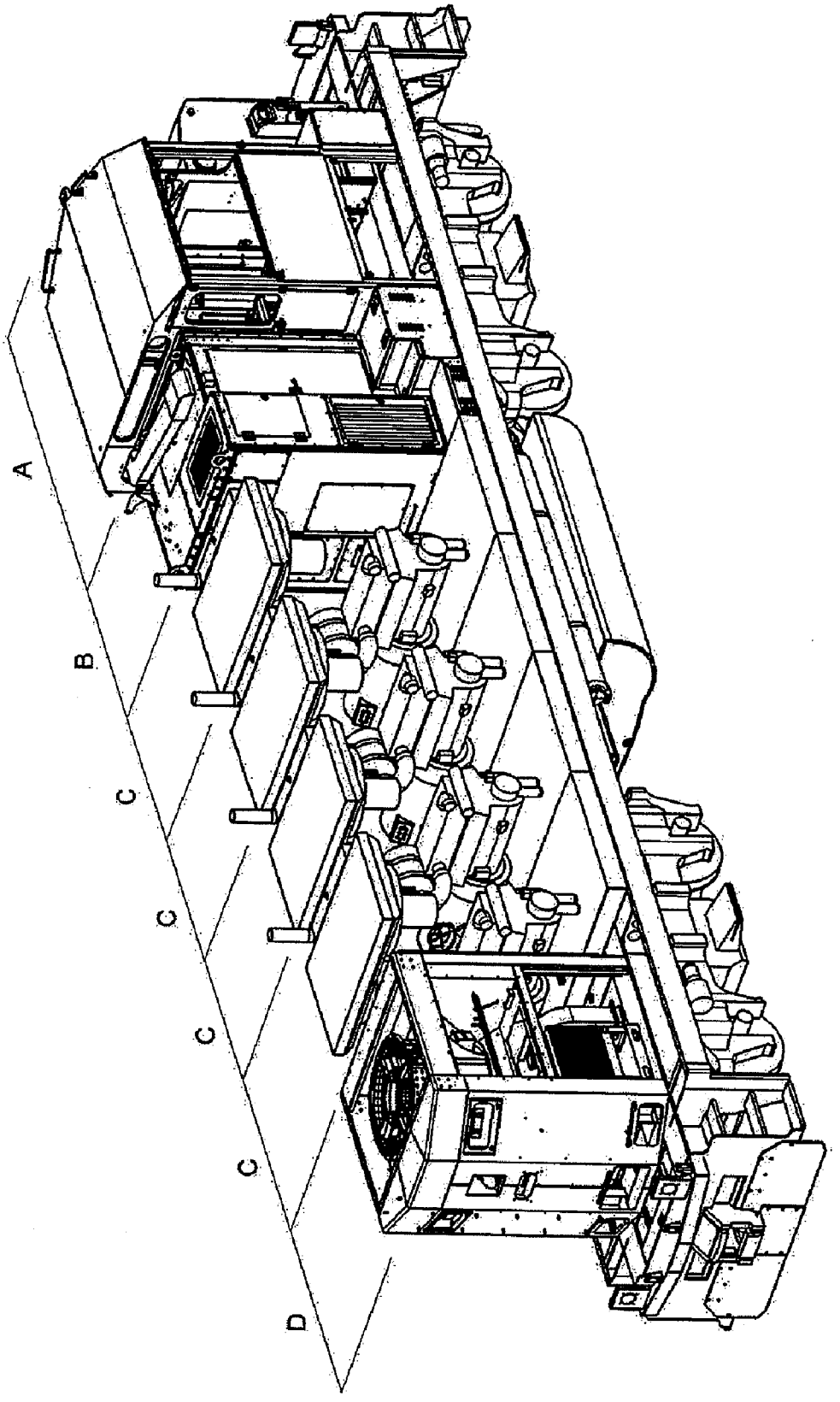

FIGURE 12A

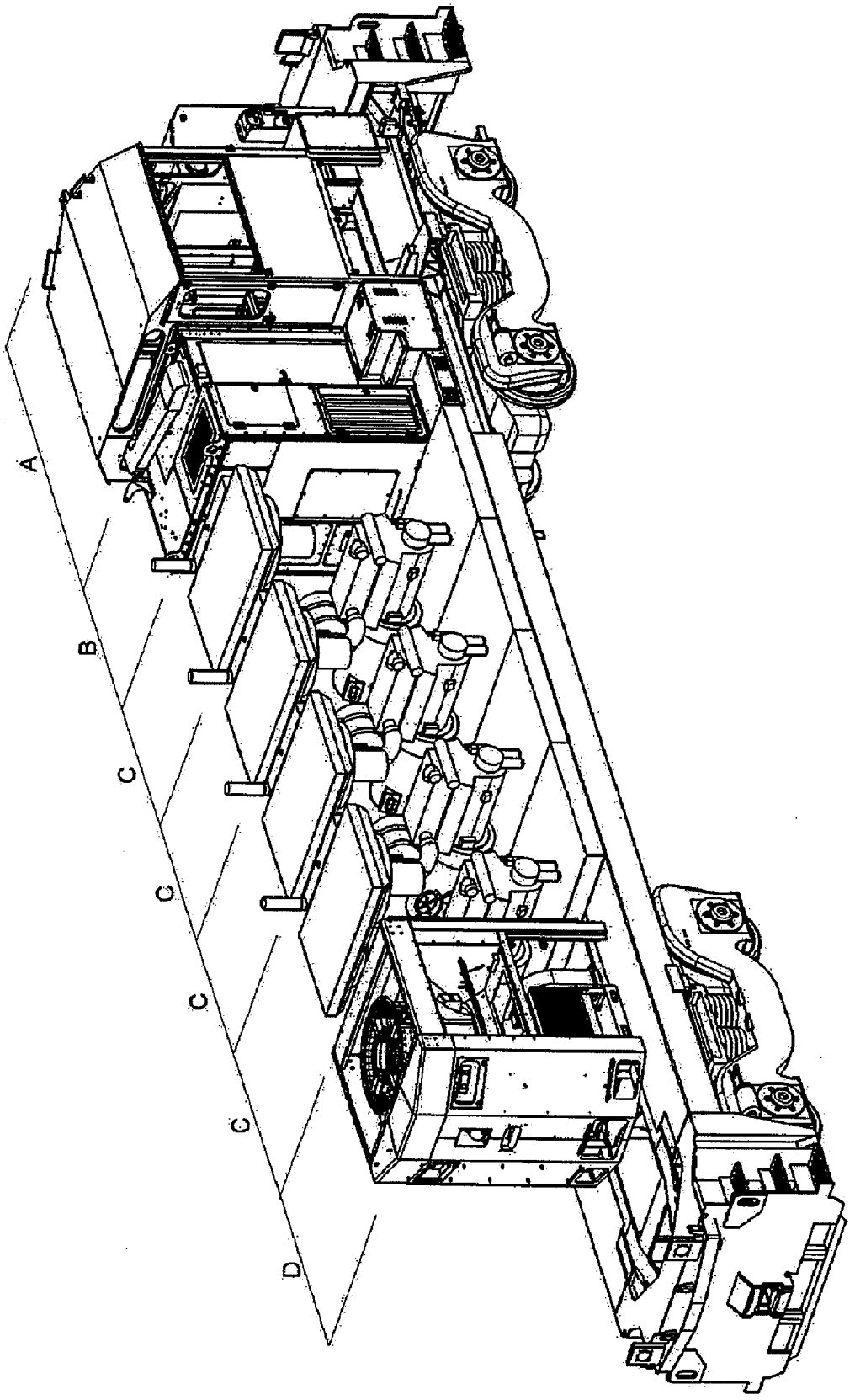

FIGURE 12B

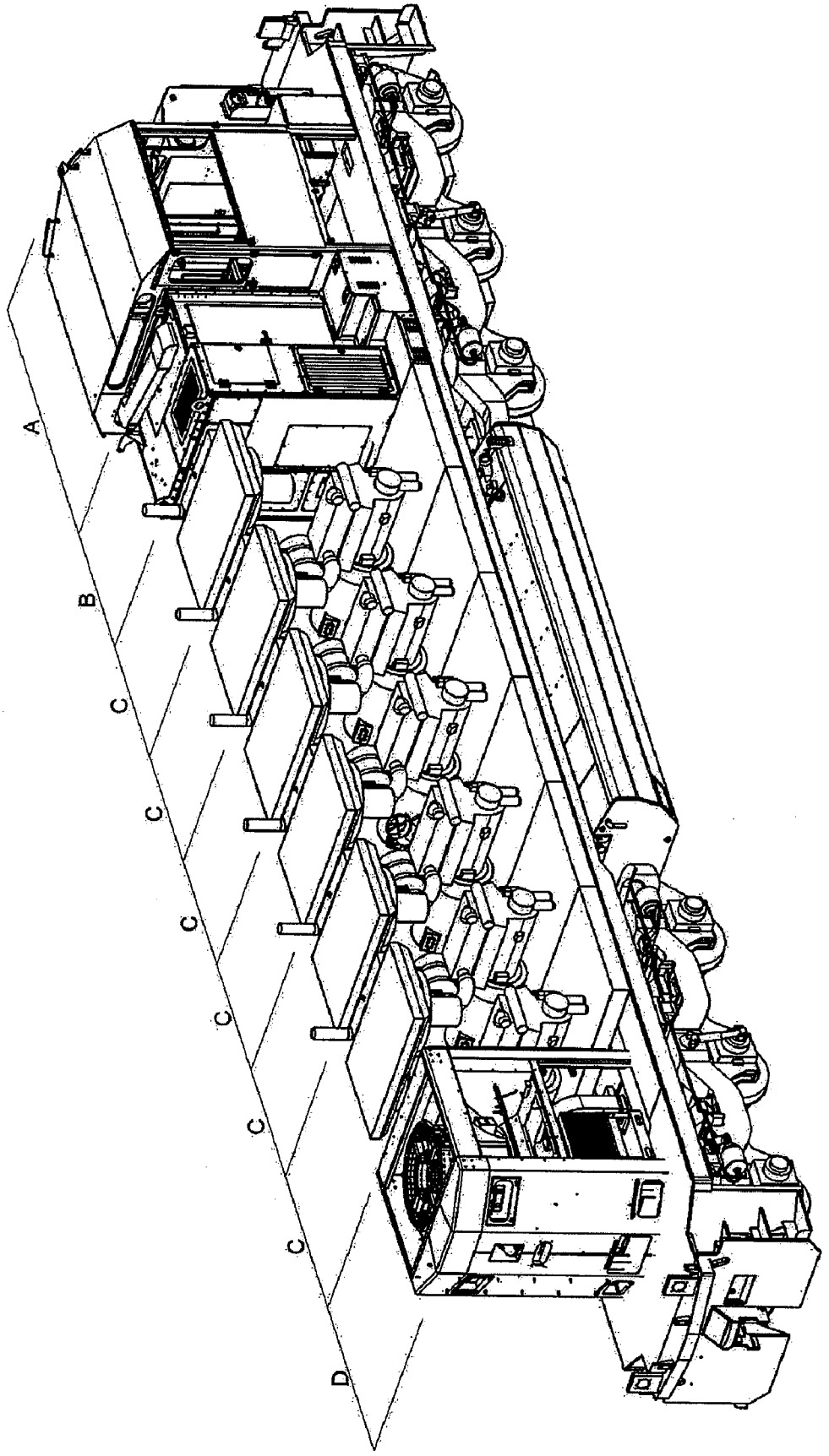

FIGURE 12C

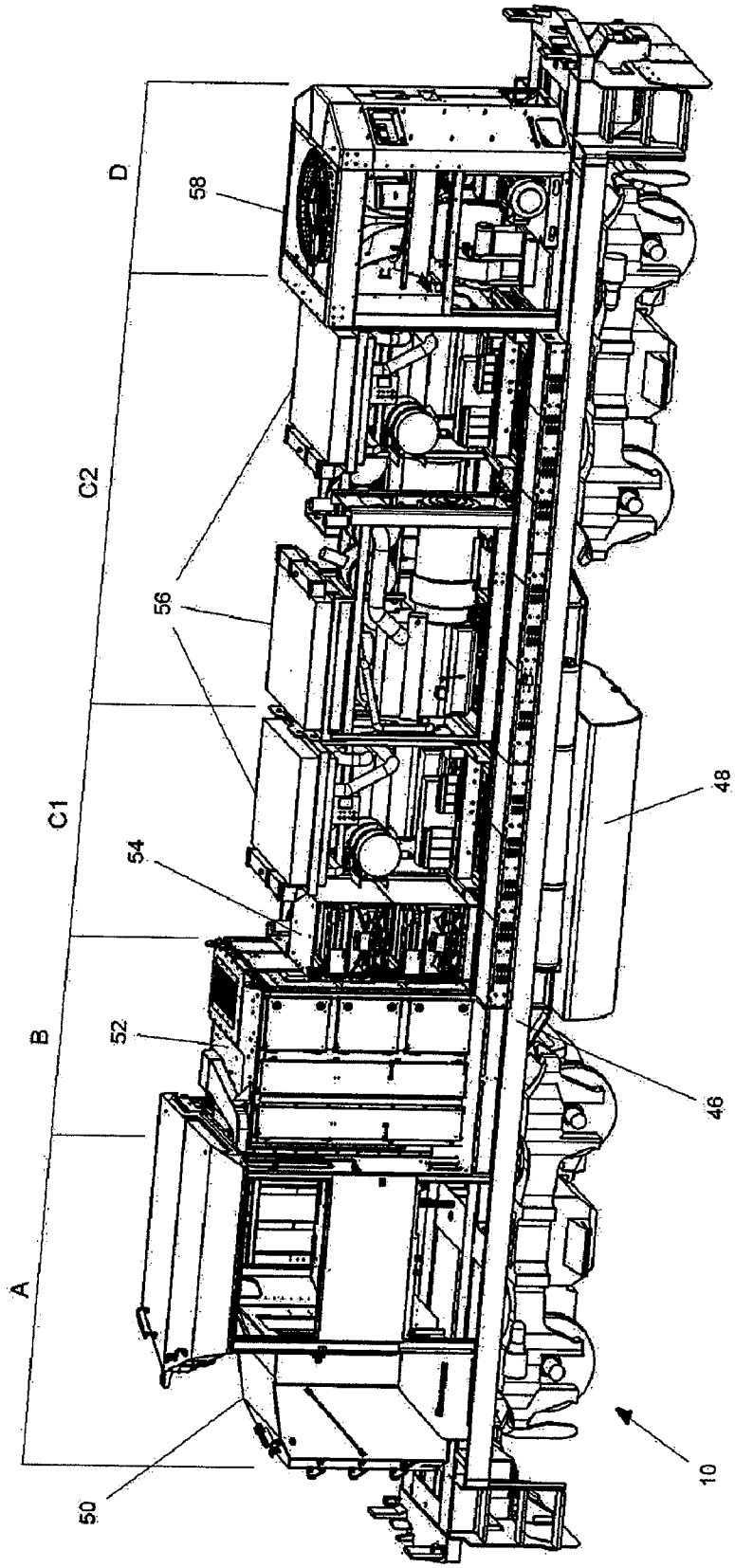

FIGURE 13

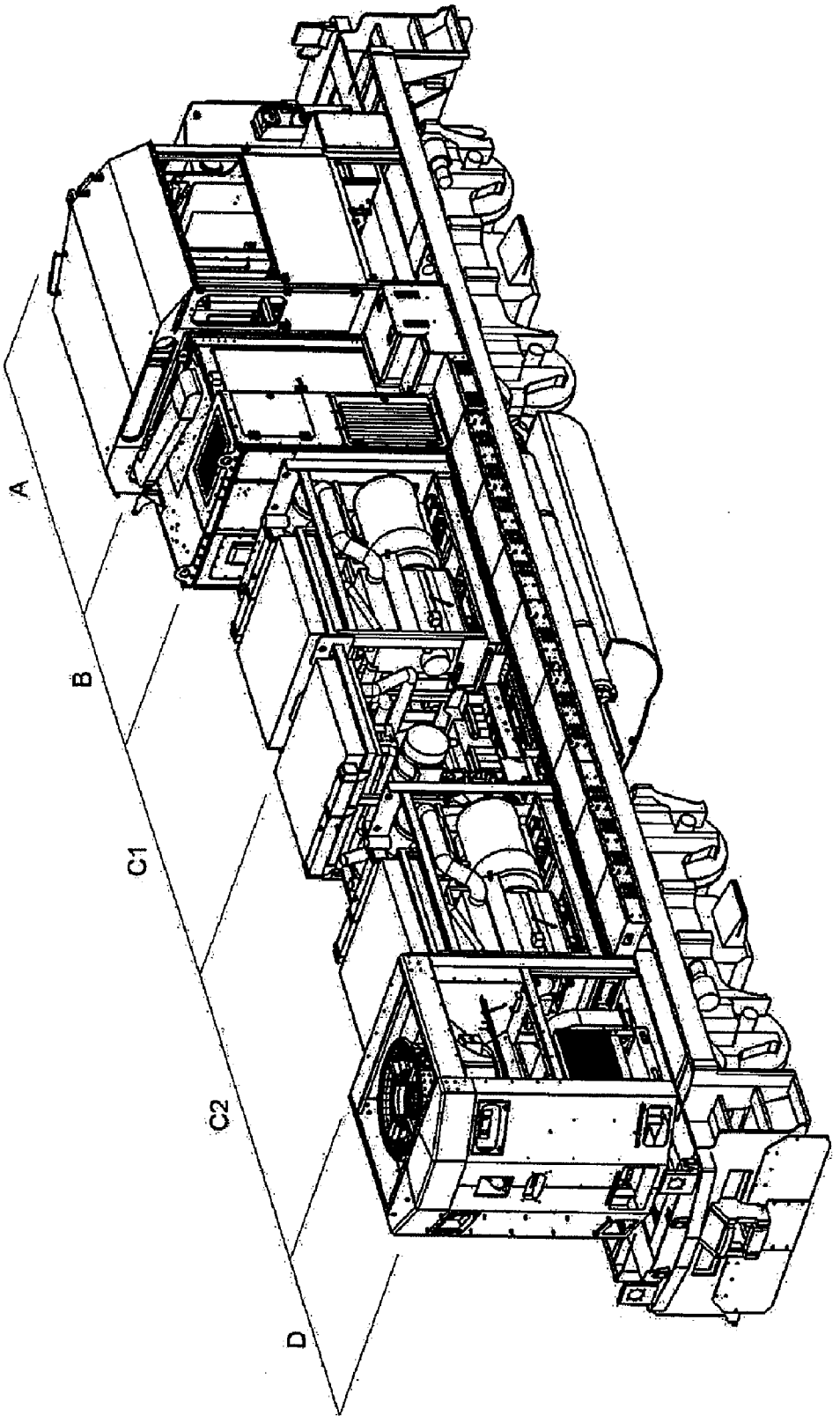

FIGURE 14A

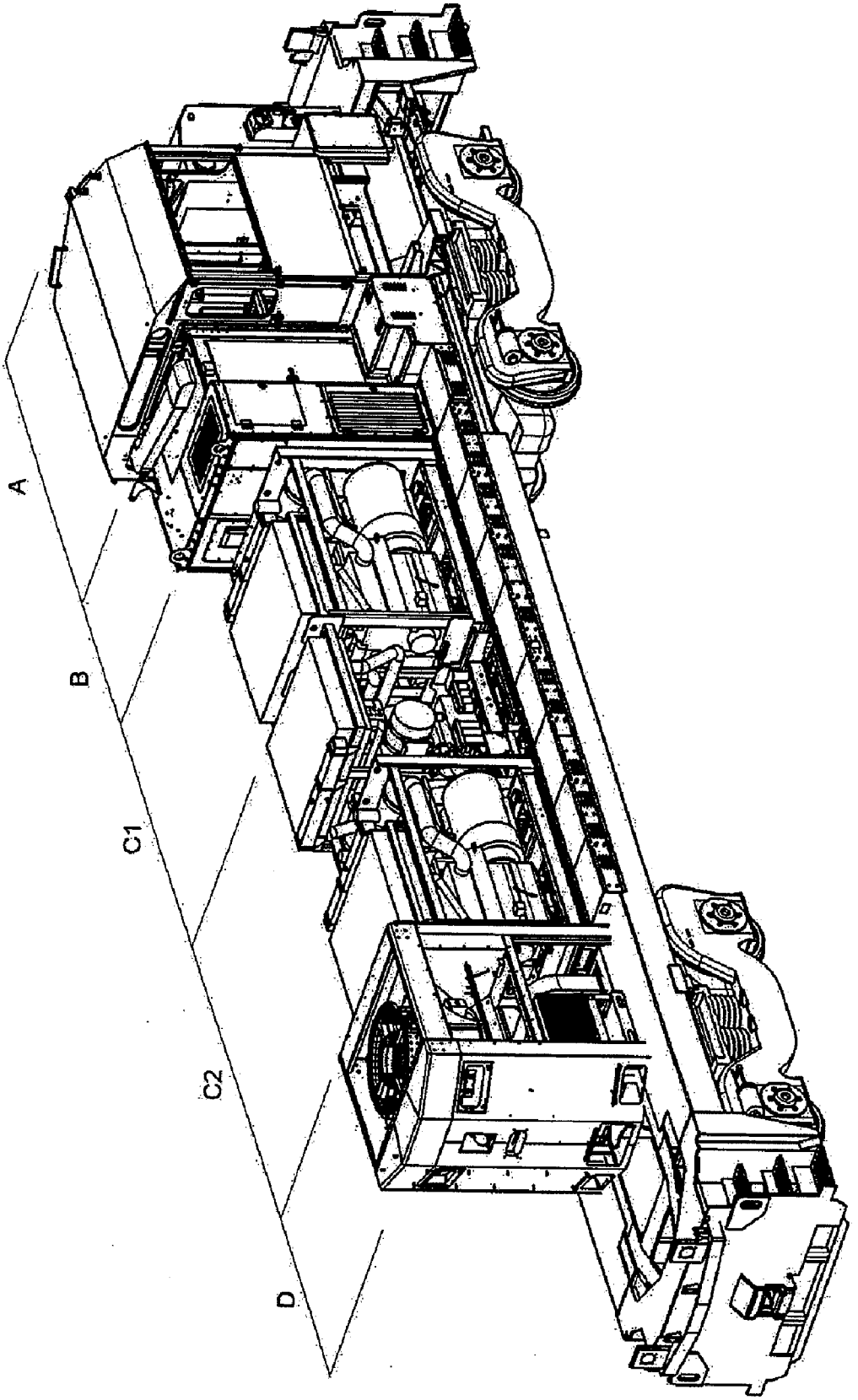

FIGURE 14B

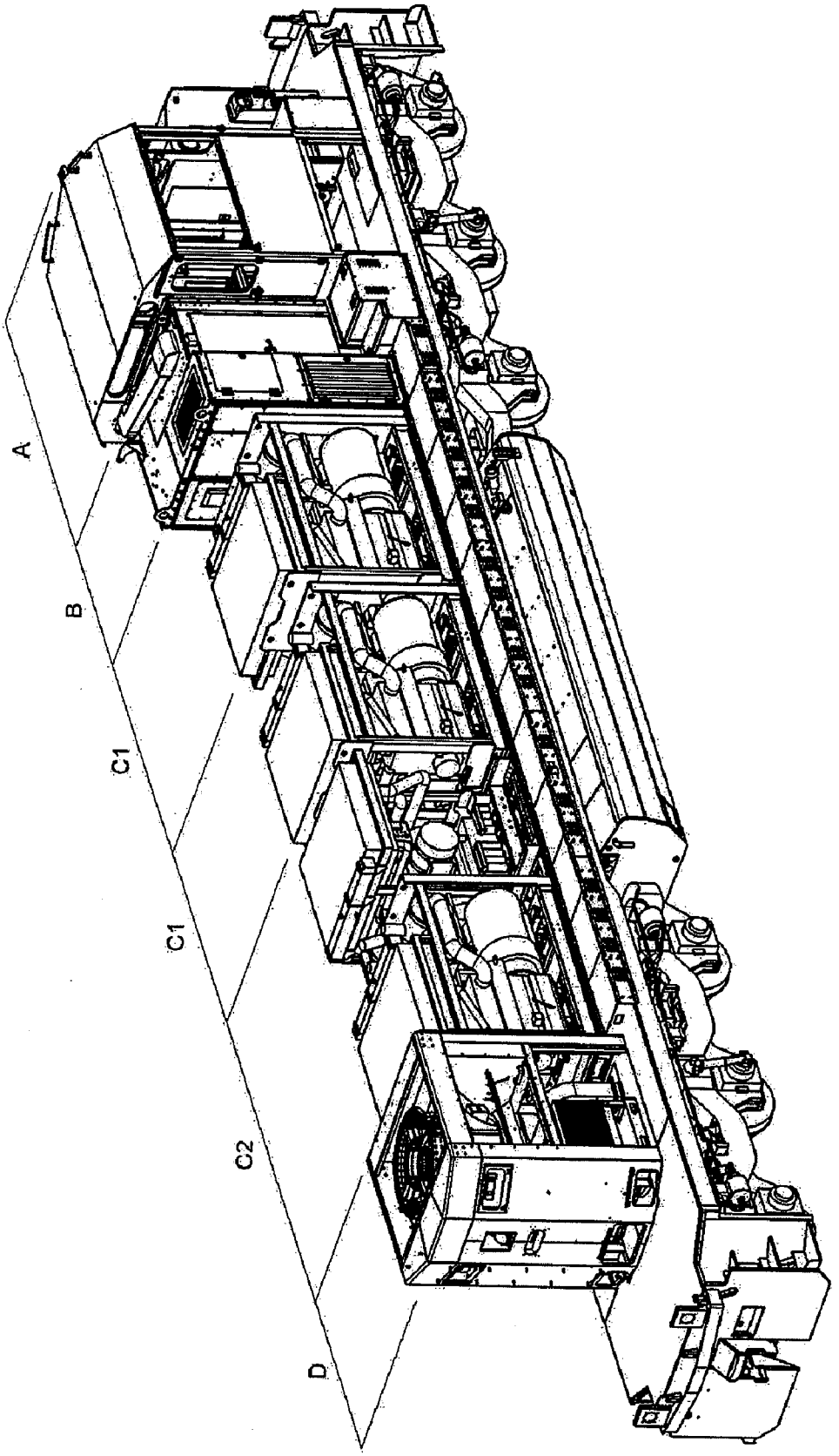

FIGURE 14C

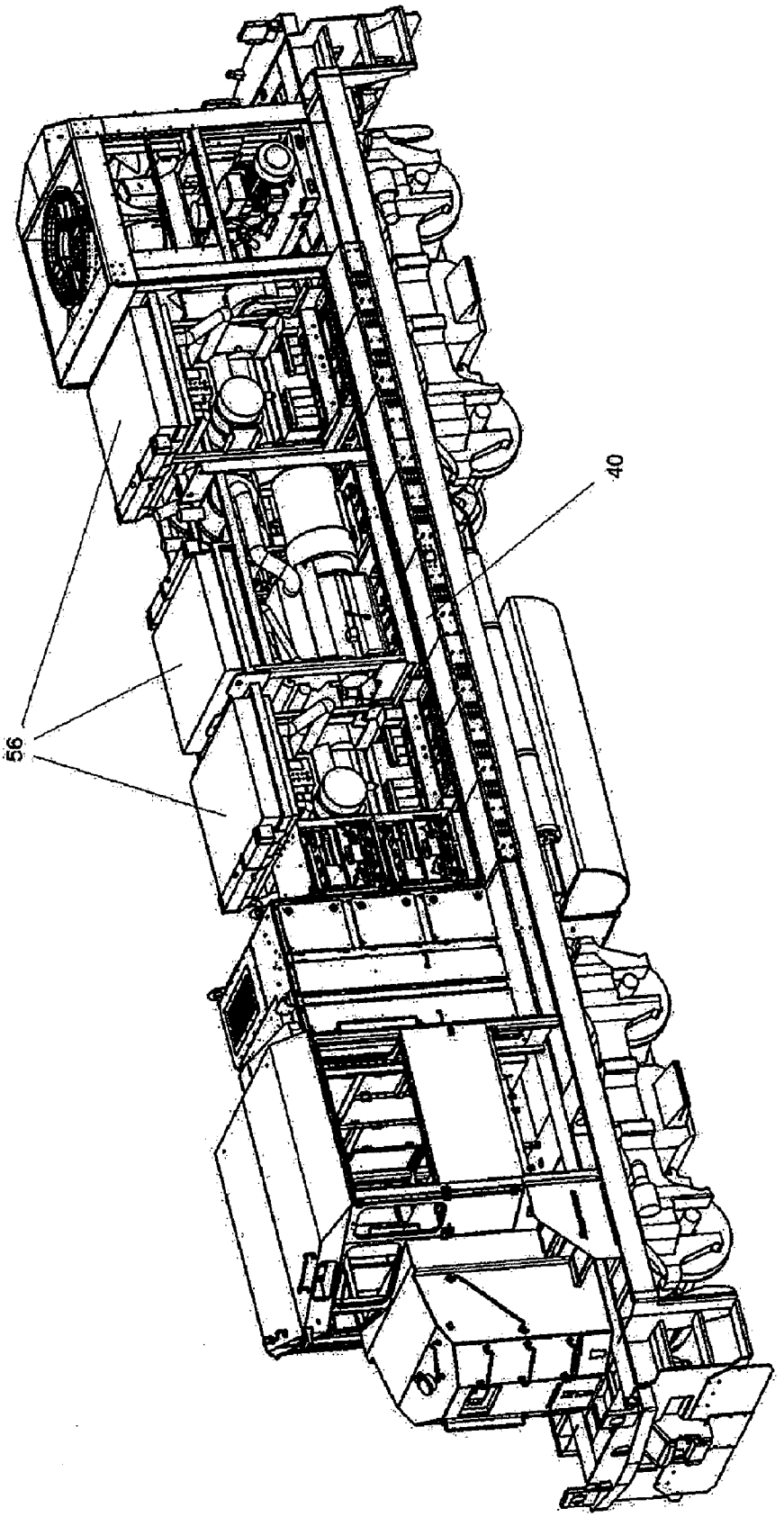

FIGURE 15

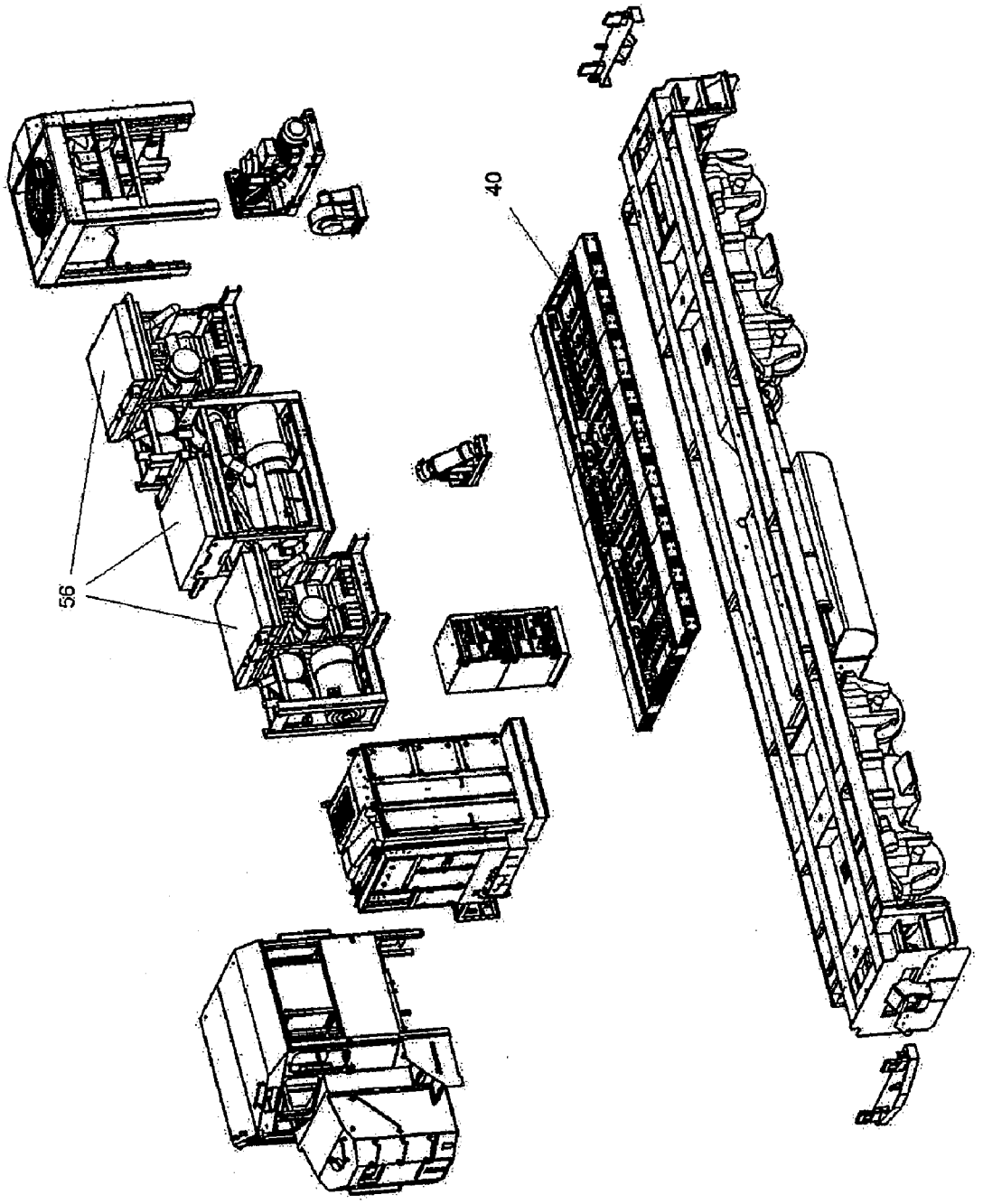

FIGURE 16

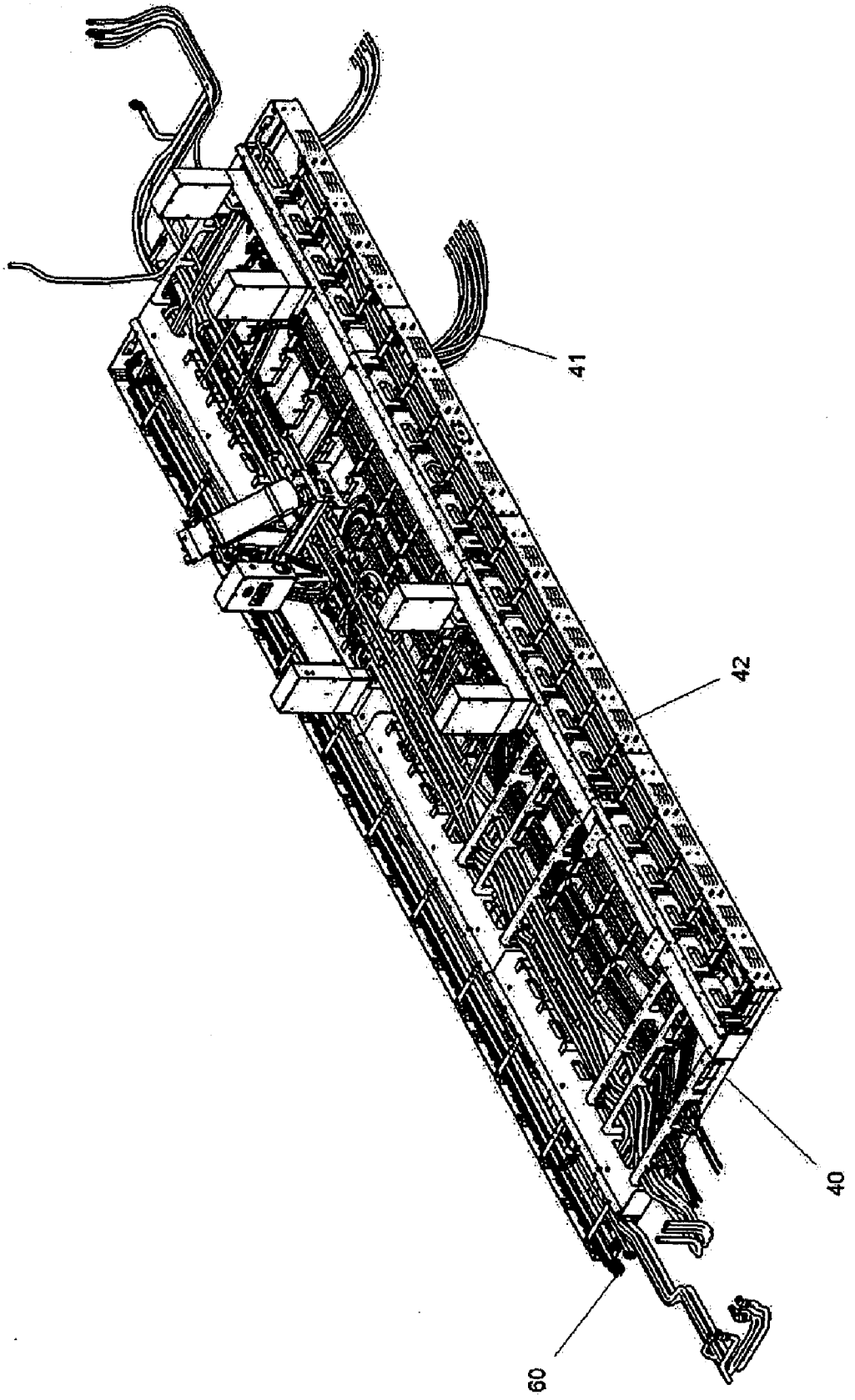

FIGURE 17

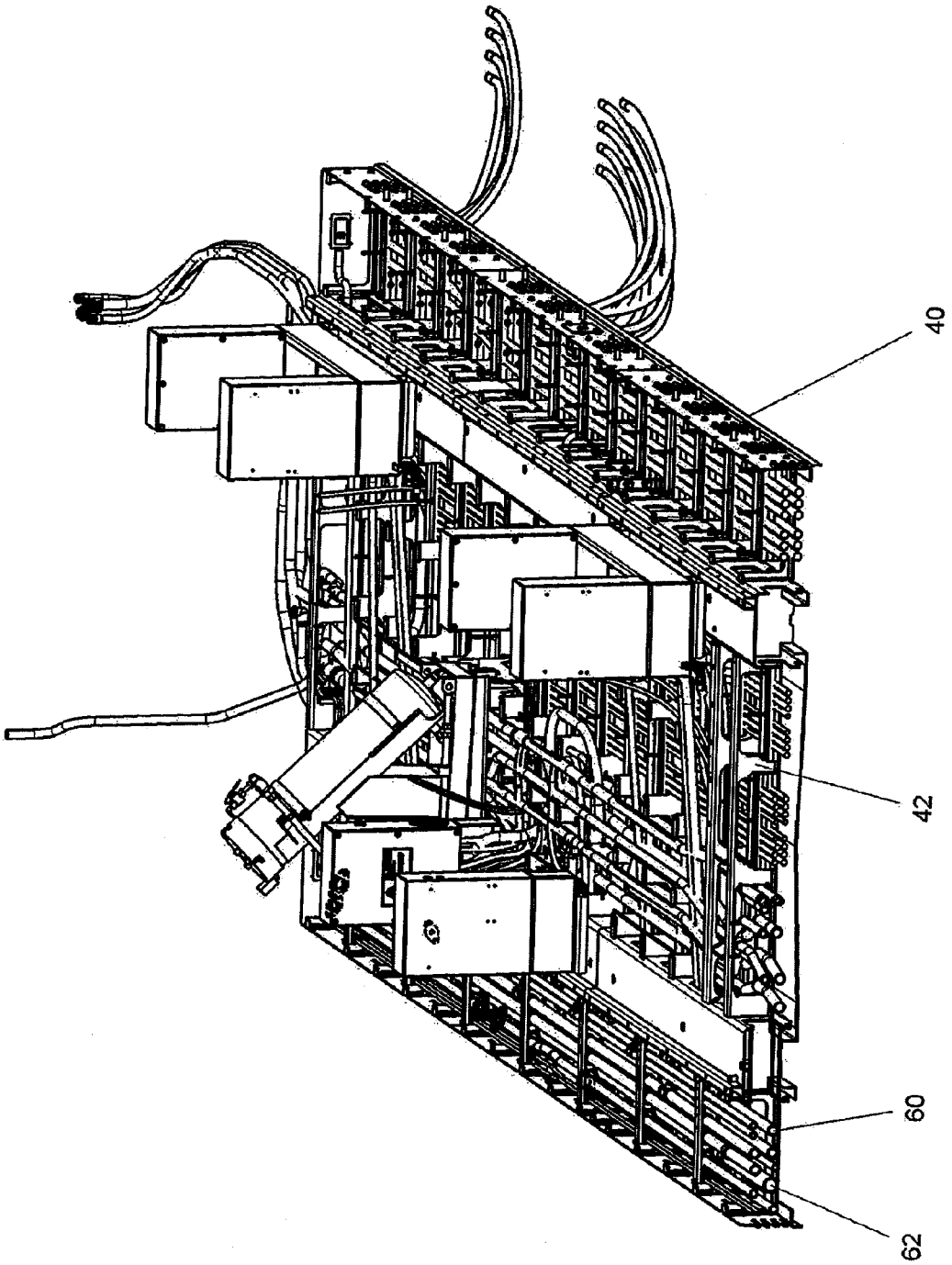

FIGURE 18

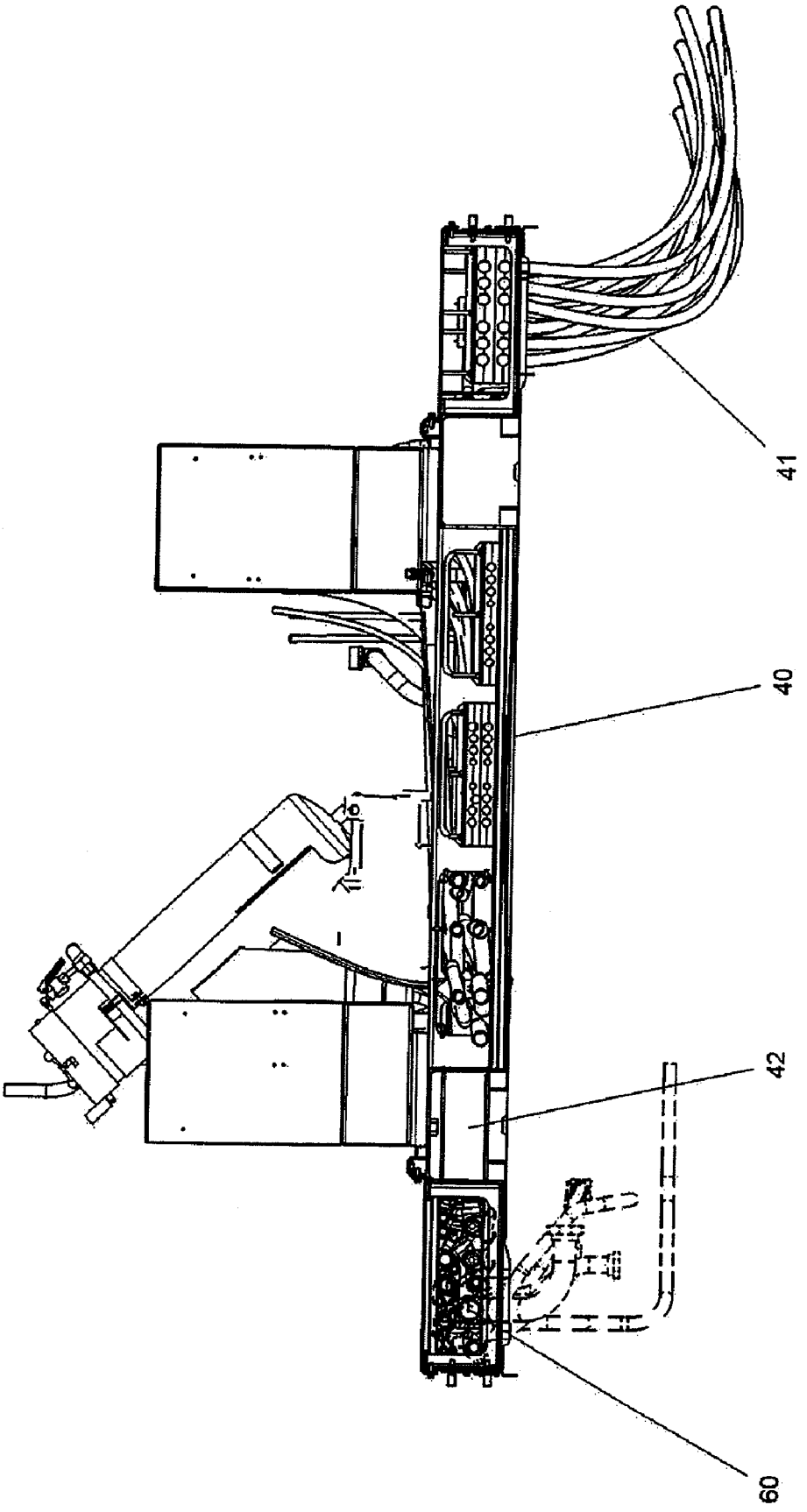

FIGURE 19

TRANSVERSAL GENERATOR SET AND MODULAR DESIGN FOR REFURBISHMENT OF LOCOMOTIVES

CROSS REFERENCE TO RELATED APPLICATION

[0001] The present application claims the benefit, under 35 U.S.C. §119(e), of U.S. Provisional Application 60/929,286 entitled "Transversal Generator Set and Modular Design for Refurbishment of Locomotives" to Burns et al filed Jun. 20, 2007, which is incorporated herein by reference.

FIELD OF THE INVENTION

[0002] The present invention generally relates to the refurbishment of train locomotives, or the like. More particularly, it relates to a transversal modular generator set to be installed on a locomotive during its refurbishment. The present invention also relates to a modular design concept which facilitates the refurbishment of locomotives through the use of a walkway interface system and standardized locomotive major sub-assemblies.

BACKGROUND OF THE INVENTION

[0003] Refurbishment of locomotive generator sets is carried out often these days as a cost-effective way for replacing older locomotives that may otherwise have other highly functional subsystems (such as traction motors, brakes, trucks and the undercarriage of the locomotive) that can still used over a period of several years with minor maintenance.

[0004] In older locomotives, sub-systems like the generator set (genset), air compressor, dynamic brake, etc. are directly applied to the locomotive platform. Consequently, for every refurbishment project and every platform generation, the interface between the sub-systems and the locomotive platform needs to be re-engineered. Normally, the genset package is oriented along the longitudinal axis of the locomotive.

[0005] FIG. **1** illustrates a longitudinal configuration of gensets on a locomotive **10**. The gensets **12** are placed in a longitudinal arrangement on the locomotive. The locomotive must also sometimes accommodate on the platform deck plates **18** a dynamic brake thereon, as well as air compressor and rear sand box systems **16**. The locomotive illustrated in FIG. **2** is a GP-9 platform with three gensets **12** placed in a longitudinal configuration, with no dynamic brake.

[0006] In order to address spacing issues of gensets, Stauffer et al. have proposed in U.S. Pat. No. 6,230,667 and U.S. Pat. No. 5,908,011 a reduced-length engine generator assembly. The arrangement of components in these gensets permits an assembly with a shorter overall length, while avoiding any significant increase in height, thus facilitating installation aboard vehicles.

[0007] Furthermore, refurbishment of gensets on locomotives of different lengths is complicated due to the fact that, when longitudinal or side-by-side configurations are used, the actual design and layout of the gensets needs to be adapted to each and every new platform length. As illustrated in the following table, the platform lengths of locomotives vary significantly from one locomotive model to another:

Original Locomotive Model	Platform Length
GP-38	55'
SW-1500	40'3"
GP-9	52'
B23-7, B30-7A	58'4" (V1, V2), 57'4" (V3)
SD-40	64'8"

[0008] There is a lack of standardization in the major sub-assemblies of the locomotive which often prevents the use or transfer of one sub-assembly from one particular locomotive and under-frame to another locomotive and under-frame. There is also a lack of standardization in common interface assemblies that could also be used for the transfer of one sub-assembly from one particular locomotive and under-frame to another locomotive and under-frame.

[0009] Thus, there is still presently a need for a locomotive generator set, as well as a configuration of the generator set on the locomotive, which can offer good performance with respect to the space it occupies along the length of the locomotive platform deck, and offer better access for maintenance purposes.

[0010] There is also a need for a modular design for locomotives using standardized major sub-assemblies that can be easily interfaced from one locomotive and under-frame to another.

SUMMARY OF THE INVENTION

[0011] Another object of the present invention is to propose a layout for the generator set on the locomotive platform deck that satisfies another one of the above-mentioned needs.

[0012] Yet another object of the present invention is to provide a walkway interface system and standardized locomotive major sub-assemblies that satisfy another one of the above-mentioned needs.

[0013] According to the present invention, there is provided a locomotive comprising:

[0014] a platform deck; and

[0015] a plurality of generator sets on the platform deck, each generator set occupying a space associated with a generally oblong footprint on the platform deck, the footprint defining a longitudinal axis along a longest length of the footprint,

wherein each generator set is positioned on the platform deck such that the longitudinal axis of the corresponding footprint is generally perpendicular to a direction of travel of the locomotive.

Preferably, the generator set comprises:

[0016] an engine generally oblong along an engine major axis;

[0017] a fuel line supplying fuel to the engine through a fuel filter;

[0018] an oil line supplying oil to the engine through an oil filter;

[0019] an electrical subsystem connected to the engine comprising:

[0020] an alternator driven by the engine, the alternator being generally oblong along an alternator major axis, the alternator major axis being generally parallel to the engine major axis; and

[0021] a junction box for power management of the electrical subsystem and positioned on the first side of the alternator;

[0022] an air passage supplying intake air to the engine through an air filter, the air filter being generally oblong along an air filter major axis, the air filter being positioned above the alternator and the air filter major axis being generally perpendicular to the alternator major axis;

[0023] an exhaust pipe for removal of exhaust gases from the engine through a muffler, the muffler being generally oblong along a muffler major axis, the muffler being positioned above the engine, the muffler major axis being generally parallel to the engine major axis;

[0024] a radiator system for cooling of the generator set and connected to the engine, the radiator system being positioned above the engine; and

[0025] an operating panel for control of the generator set.

[0026] According to the present invention, there is also provided a walkway interface structure for supporting a locomotive sub-assembly on a locomotive platform having a platform width, the walkway interface structure comprising:

[0027] a base structure adapted to be removably placed on the locomotive platform, the base structure supporting the locomotive sub-assembly and having a base width substantially corresponding to the platform width; and

[0028] at least one interface means traversing the base structure for operatively connecting the locomotive sub-assembly to another locomotive sub-system.

[0029] Preferably, the interface means comprises an element selected from the group consisting of traction motor cables, generator set power cables, dynamic brake power cables, power wires, control harnesses, fuel lines, drains, piping lines or ducting.

[0030] The transversal genset according to the present invention offers a better HP/linear feet ratio compared to most actual locomotives with their gensets aligned along the length of the locomotive. The present genset also offers better access for maintenance purposes with full access to all sides of the genset. The genset according to the present invention also simplifies hood designs, as much less doors are required for access to the genset. Furthermore, the present genset is designed to comply with an overall modularity and parametrization concept for locomotives.

[0031] The concept of a modular design consists of having standardized major sub-assemblies that can be easily interface from one locomotive and under-frame to another. The main benefits of this concept include:

[0032] Reduced engineering and drafting time for new locomotive orders

[0033] Simplified Manufacturing

[0034] Cost savings

[0035] Quicker Time to Market

[0036] Improved Reliability

[0037] Reduction in Design Documentation

[0038] Design Parameterization

[0039] The walkway interface structure according to the present invention provides a structure to be added over the full width of the platform and provides a number of pre-run cables and pipes to standardized locations on the locomotive. These types of interface structures, in combination with standardized sub-assemblies, including the gensets in accordance with the present invention, can be grouped together in different configurations to meet customer needs.

[0040] A non-restrictive description of preferred embodiments of the invention will now be given with reference to the appended drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0041] FIG. **1** is a perspective view of a prior art locomotive with gensets positioned in a longitudinal configuration along the length of the platform;

[0042] FIG. **2** is an opposite perspective view of the locomotive shown in FIG. **1**;

[0043] FIG. **3** is a perspective view of a genset according to a preferred embodiment of the present invention;

[0044] FIG. **4** shows a layout of the footprints of gensets in a transverse configuration with respect to actual and side-by-side configurations;

[0045] FIG. **5** is an exploded perspective view of a locomotive with modular transversal gensets in accordance with another preferred embodiment of the present invention;

[0046] FIG. **6** is an opposite exploded perspective view of the locomotive shown in FIG. **5**;

[0047] FIG. **7** is a perspective view of a locomotive with modular transversal gensets in accordance with a preferred embodiment of the present invention;

[0048] FIG. **8** is an opposite perspective view of the locomotive shown in FIG. **7**;

[0049] FIG. **9** is a side view of the locomotive shown in FIG. **7**;

[0050] FIG. **10** is an opposite side view of the locomotive shown in FIG. **9**;

[0051] FIG. **11** is a perspective view of a locomotive with walkway interface structures and gensets in a transverse configuration in accordance with another preferred embodiment of the present invention;

[0052] FIGS. **12**A-**12**C are perspective views of locomotives with different configurations of walkway interface structures and gensets in a transverse configuration in accordance with other preferred embodiments of the present invention;

[0053] FIG. **13** is a perspective view of a locomotive with walkway interface structures and gensets in a longitudinal configuration in accordance with yet another preferred embodiment of the present invention;

[0054] FIGS. **14**A-**14**C are perspective views of locomotives with different configurations of walkway interface structures and gensets in a longitudinal configuration in accordance with other preferred embodiments of the present invention.

[0055] FIG. **15** is a perspective view of a locomotive with walkway interface structures and gensets in accordance with another preferred embodiment of the present invention;

[0056] FIG. **16** is an exploded perspective view of the locomotive shown in FIG. **15**;

[0057] FIG. **17** is a perspective view of a walkway interface structure according to a preferred embodiment of the present invention;

[0058] FIG. **18** is a perspective sectional view of the walkway interface structure shown in FIG. **17**; and

[0059] FIG. **19** is a side view the walkway interface structure shown in FIG. **17**.

DESCRIPTION OF PREFERRED EMBODIMENTS

[0060] Referring to FIG. **4** for a schematic view and FIGS. **5-6** for exploded perspective views, the present invention provides a locomotive **30** comprising a platform deck **32** and a plurality of generator sets **34** on the platform deck **32**, each generator set **34** occupying a space associated with a generally oblong footprint **36** on the platform deck **32**, the footprint **36** defining a longitudinal axis along a longest length of the footprint **36**. Each generator set **34** is positioned on the platform deck **32** such that the longitudinal axis of the corresponding footprint **36** is generally perpendicular to a direction of travel of the locomotive **30**.

[0061] As explained previously, this layout of the generator sets on the platform has a number of advantages. A comparison of this transversal configuration of gensets with respect to prior art configurations is illustrated schematically in FIG. **4** and a summary comparison between the same three configurations is provided in the following table:

Criteria	Actual	Transversal
HP/linear ft	7.3 HP/ft (3 gensets)	10.3 HP/ft (4 gensets)
Maintenance access	Good	Very good all sides
Universal package	Allows longer engine	Does not allow longer engine
Modularity friendly	Fair	Very good
Interconnect friendly	Fair	Very good

[0062] Referring to FIGS. **5** and **6**, an exploded view of a locomotive **10** with gensets **34** placed in a tranversal configuration is shown to illustrate the positioning of the gensets **34** under the hoods **38**. The locomotive shown in FIGS. **5** and **6** is a GP-9 platform with four gensets **34** and a dynamic brake. FIGS. **7-10** show the same locomotive **10** of FIGS. **5** and **6** with the gensets **34** and hoods **38** installed.

[0063] Referring to FIG. **3**, preferably each generator set **100** comprises an engine **102** generally oblong along an engine major axis, a fuel line supplying fuel to the engine through a fuel filter **104** and an oil line supplying oil to the engine through an oil filter **106**. The generator set **100** also comprises an electrical subsystem connected to the engine **102**. The electrical subsystem comprises an alternator **108** driven by the engine **102**, the alternator **108** being generally oblong along an alternator major axis, the alternator major axis being generally parallel to the engine major axis.

[0064] The electrical subsystem also comprises starting batteries **110** for startup of the engine **102** and positioned on a first side of the alternator **108**. The electrical subsystem also comprises a junction box **112** for power management of the electrical subsystem and is positioned on the same first side of the alternator **108**.

[0065] The generator set **100** further comprises an air passage supplying intake air to the engine **102** through an air filter **114**, the air filter **114** being generally oblong along an air filter major axis, the air filter **114** being positioned above the alternator and the air filter major axis being generally perpendicular to the alternator major axis. The generator set **100** also comprises an exhaust pipe **116** for removal of exhaust gases from the engine **102** through a muffler **118**, the muffler **118** being generally oblong along a muffler major axis, the muffler **118** being positioned above the engine **102**, and the muffler major axis being generally parallel to the engine major axis. The generator set **100** also comprises a radiator system **120** for cooling of the generator set **100** and connected to the engine **102**, the radiator system **120** being positioned above the engine. The generator set **100** also comprises an operating panel **122** for control of the generator set **100**.

[0066] Preferably, each generator set ("genset") has overall dimensions of 110"×48"×96" and comprises a pair of rectangular radiators **124** with two fans or motors **126**. The outline of the individual on FIG. **3** illustrates how there is a good amount of space available for circulation around the gensets on the platform for maintenance, inspection or other purposes. Referring to FIGS. **11** to **14**C, the present invention also provides a walkway interface structure **40** for supporting a locomotive sub-assembly **44** on a locomotive platform **46** having a platform width. The walkway interface structure is part of a modular design consisting of having standardized major sub-assemblies that can be easily interfaced from one locomotive and under frame to another as mentioned previously. As shown in FIG. **11**, the walkway interface structure **40** comprises a base structure **42** supporting the locomotive sub-assembly **44** and having a base width substantially corresponding to the platform width. The walkway interface structure **40** also comprises at least one interface means **41**, as shown in FIG. **17**, traversing the base structure **42** for operatively connecting the locomotive sub-assembly **44** to another locomotive sub-system **48**, like a fuel tank for example.

[0067] Preferably, the interface means comprises an element selected from the group consisting of traction motor cables, generator set power cables, dynamic brake power cables, power wires, control harnesses, fuel lines, drains, piping lines or ducting.

[0068] Preferably, as shown in FIGS. **17** to **19**, the walkway interface structure **40** may comprise connections **60** for connecting to a further walkway interface structure, the further walkway interface structure supporting a further locomotive sub-assembly on the locomotive platform. Hence several walkway interface structures may be connected together. Preferably, the connections **60** comprise at least one connection element also selected from the group consisting of traction motor cables, generator set power cables, dynamic brake power cables, power cables, power wires, control harnesses, fuel lines, drains, piping lines or ducting. The base structure **42** comprises internal passageways **62** for passage of the connection elements from one end of the walkway interface structure to the other, which helps facilitate modular assembly of several walkway interface structures together as pre-run cables and pipes can travel through the base structures along the length of the locomotive.

[0069] FIG. **11** illustrates this modular design concept applied to a road switcher locomotive with a GP9 platform. As shown, the walkway interface structure **40** (also called Full Walkway Interface) is a structure that is added over the full width of the platform allowing to pre-run cables and pipes to standard locations. The walkway interface structure **40** is separated into a number of sections designated as A-B-C-D for the types of subassemblies it supports. Section A is a standard walkway interface structure **40** to be used with operator cab sub-assemblies **50**. Section B is a standard walk-

way interface structure **40** to be used with sub-assemblies including a high voltage cabinet **52** and a number of accessories **54**, including batteries, fuel pumps and front traction motor blowers. Section C is a standard walkway interface structure **40** to be used with genset sub-assemblies **56**. Section D is a custom walkway interface structure **40** to be used with other sub-assemblies **58** including rear traction motor blowers, air compressors, sand boxes and dynamic brakes. FIGS. **12**A to **12**C illustrate how the different sections A–B–C–D can be used on different platforms of different lengths. FIG. **12**A is a GP9 platform measuring 52'. FIG. **12**B is a B23-7 platform measuring 58'-4". FIG. **12**C is a SD-40 platform measuring 64'-8".

[0070] The modular design according to the present invention includes standardized sub-assemblies that can be grouped together in different configurations to fit customer needs:

[0071] Ex1: Block A+B+C+C+C+D for a standard 3 genset configuration on a GP9 platform

[0072] Ex2: Block A+B+C+C+E+D for a 2 genset configuration on a longer platform

[0073] Every component needed to interface with the subsystem and the underdeck would be included in the walkway interface structure.

[0074] This mechanical modular design can undergo evolutionary steps. It also can be used with gensets positioned in longitudinal configurations and not only transversal configurations in accordance with the present invention. Typically, each walkway interface structure will be 120" wide by 8" high by a length "X" to be determined depending on the application. The walkway interface structure also has a number of interface means, including, but not limited to:

[0075] Traction motor cables (535) for up to 6 axles

[0076] Genset power cables (4/0) for up to 4 gensets

[0077] Dynamic brake power cables (4/0)

[0078] All other small power wires (for air compressors, traction motor blowers, fans . . .)

[0079] All control harnesses (lighting, sensors, can wire . . .)

[0080] Fuel lines from fuel tank and to gensets (suction, returns)

[0081] Drains from gensets (ecology, lube oil, coolant) and water collection drain

[0082] Air brake piping lines

[0083] Traction Motor Blowers ducting

[0084] FIGS. **13** to **14**C illustrate Phase **1** of the modular design according to the present invention applied to road switcher locomotives with gensets **56** in a longitudinal configuration and how the different sections A–B–C–D–E can be used on different platforms of different lengths. FIGS. **13** and **14**A is a GP9 platform measuring 52'. FIG. **14**B is a B23-7 platform measuring 58'-4". FIG. **14**C is a SD-40 platform measuring 64'-8". FIGS. **15** and **16** illustrate another example of the use of a walkway interface structure on a GP9 platform.

[0085] Although the present invention has been explained hereinabove by way of preferred embodiments thereof, it should be understood that the invention is not limited to these precise embodiments and that various changes and modifications may be effected therein without departing from the scope or spirit of the invention.

What is claimed is:

1. A locomotive comprising:

a platform deck; and

a plurality of generator sets on the platform deck, each generator set occupying a space associated with a generally oblong footprint on the platform deck, the footprint defining a longitudinal axis along a longest length of the footprint,

wherein each generator set is positioned on the platform deck such that the longitudinal axis of the corresponding footprint is generally perpendicular to a direction of travel of the locomotive.

2. The locomotive according to claim **1**, wherein each of the plurality of generator sets comprises:

an engine generally oblong along an engine major axis;

a fuel line supplying fuel to the engine through a fuel filter;

an oil line supplying oil to the engine through an oil filter;

an electrical subsystem connected to the engine comprising:

an alternator driven by the engine, the alternator being generally oblong along an alternator major axis, the alternator major axis being generally parallel to the engine major axis; and

a junction box for power management of the electrical subsystem and positioned on the first side of the alternator;

an air passage supplying intake air to the engine through an air filter, the air filter being generally oblong along an air filter major axis, the air filter being positioned above the alternator and the air filter major axis being generally perpendicular to the alternator major axis;

an exhaust pipe for removal of exhaust gases from the engine through a muffler, the muffler being generally oblong along a muffler major axis, the muffler being positioned above the engine, the muffler major axis being generally parallel to the engine major axis;

a radiator system for cooling of the generator set and connected to the engine, the radiator system being positioned above the engine; and

an operating panel for control of the generator set.

3. A walkway interface structure for supporting a locomotive sub-assembly on a locomotive platform having a platform width, the walkway interface structure comprising:

a base structure adapted to be removably placed on the locomotive platform, said base structure supporting the locomotive sub-assembly and having a base structure width substantially corresponding to the platform width; and

at least one interface means traversing the base structure for operatively connecting the locomotive sub-assembly to another locomotive sub-system.

4. The walkway interface structure according to claim **3**, wherein the at least one interface means comprises an element selected from the group consisting of traction motor cables, generator set power cables, dynamic brake power cables, power cables, power wires, control harnesses, fuel lines, drains, piping lines or ducting.

5. The walkway interface structure according to claim **3**, further comprising connections for connecting to a further walkway interface structure, said further walkway interface structure supporting a further locomotive sub-assembly on the locomotive platform.

6. The walkway interface structure according to claim **5**, wherein the connections comprise at least one connection

element selected from the group consisting of traction motor cables, generator set power cables, dynamic brake power cables, power cables, power wires, control harnesses, fuel lines, drains, piping lines or ducting.

7. The walkway interface structure according to claim **5**, wherein the base structure comprises at least one internal passageway through which the connections extend from a first extremity of the walkway interface structure to a second opposite extremity of the walkway interface structure.

8. The walkway interface structure according to claim **4**, further comprising connections for connecting to a further walkway interface structure, said further walkway interface structure supporting a further locomotive sub-assembly on the locomotive platform.

9. The walkway interface structure according to claim **8**, wherein the connections comprise at least one connection element selected from the group consisting of traction motor cables, generator set power cables, dynamic brake power cables, power cables, power wires, control harnesses, fuel lines, drains, piping lines or ducting.

10. The walkway interface structure according to claim **8**, wherein the base structure comprises at least one internal passageway through which the connections extend from a first extremity of the walkway interface structure to a second opposite extremity of the walkway interface structure.

11. The walkway interface structure according to claim **9**, wherein the base structure comprises at least one internal passageway through which the connections extend from a first extremity of the walkway interface structure to a second opposite extremity of the walkway interface structure.

12. A locomotive comprising a plurality of walkway interface structures as claimed in claim **3**.

13. The locomotive according to claim **1**, further comprising a plurality of walkway interface structures, each of said plurality of walkway interface structures supporting a corresponding one of the plurality of generator sets on the platform deck and comprising:

a base structure adapted to be removably placed on the locomotive platform deck, said base structure supporting the corresponding generator set and having a base structure width substantially corresponding to the platform width; and

at least one interface means traversing the base structure for operatively connecting the corresponding generator set to another locomotive sub-system.

14. The locomotive according to claim **2**, further comprising a plurality of walkway interface structures, each of said plurality of walkway interface structures supporting a corresponding one of the plurality of generator sets on the platform deck and comprising:

a base structure adapted to be removably placed on the locomotive platform deck, said base structure supporting the corresponding generator set and having a base structure width substantially corresponding to the platform width; and

at least one interface means traversing the base structure for operatively connecting the corresponding generator set to another locomotive sub-system.

15. The locomotive according to claim **13**, wherein the at least one interface means comprises an element selected from the group consisting of traction motor cables, generator set power cables, dynamic brake power cables, power cables, power wires, control harnesses, fuel lines, drains, piping lines or ducting.

16. The locomotive according to claim **15**, wherein each of the plurality of walkway interface structures comprises connections for connecting to an adjacent walkway interface structure.

17. The locomotive according to claim **16**, wherein the connections comprise at least one connection element selected from the group consisting of traction motor cables, generator set power cables, dynamic brake power cables, power cables, power wires, control harnesses, fuel lines, drains, piping lines or ducting.

18. The locomotive according to claim **16**, wherein each base structure of a corresponding walkway interface structure comprises at least one internal passageway through which the connections extend from a first extremity of the corresponding walkway interface structure to a second opposite extremity of the corresponding walkway interface structure.

19. The locomotive according to claim **17**, wherein each base structure of a corresponding walkway interface structure comprises at least one internal passageway through which the connections extend from a first extremity of the corresponding walkway interface structure to a second opposite extremity of the corresponding walkway interface structure.

20. The locomotive according to claim **14**, wherein the at least one interface means comprises an element selected from the group consisting of traction motor cables, generator set power cables, dynamic brake power cables, power cables, power wires, control harnesses, fuel lines, drains, piping lines or ducting, wherein each of the plurality of walkway interface structures comprises connections for connecting to an adjacent walkway interface structure, wherein the connections comprise at least one connection element selected from the group consisting of traction motor cables, generator set power cables, dynamic brake power cables, power cables, power wires, control harnesses, fuel lines, drains, piping lines or ducting, and wherein each base structure of a corresponding walkway interface structure comprises at least one internal passageway through which the connections extend from a first extremity of the corresponding walkway interface structure to a second opposite extremity of the corresponding walkway interface structure.

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